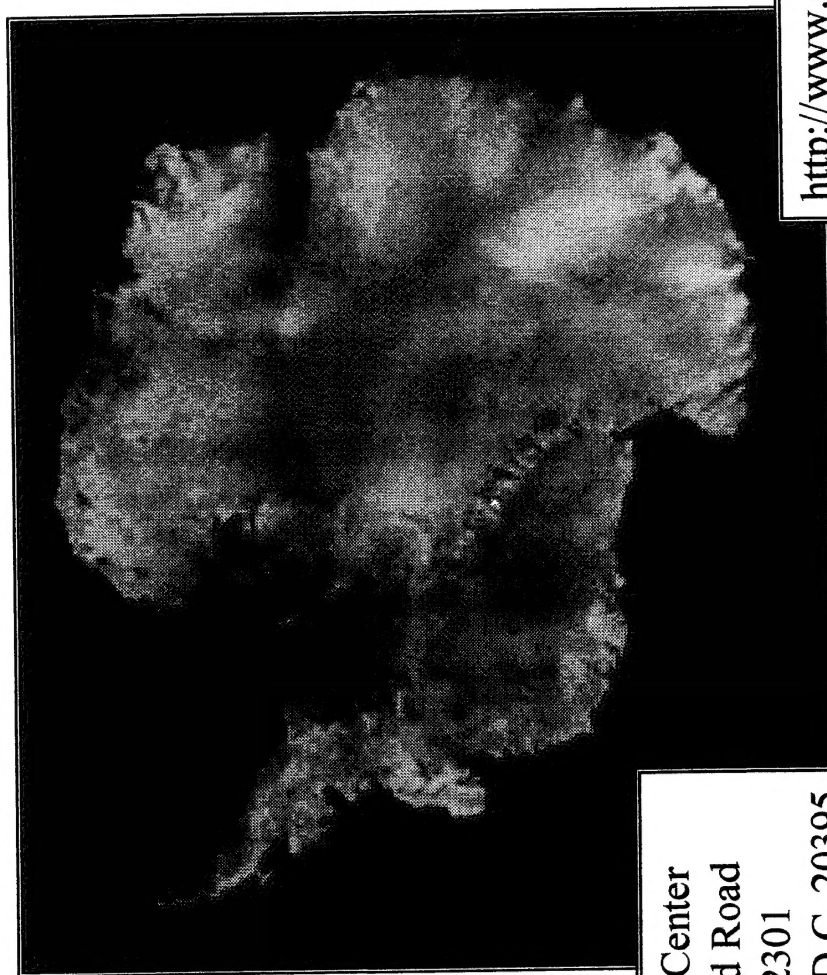




National Ice Center Antarctic Sea Ice Atlas 1996



19990722 019



National Ice Center
4251 Suitland Road
FB4, Room 2301
Washington D.C. 20395

<http://www.natice.noaa.gov>

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PREFACE

The National Ice Center (NIC), under sponsorship of the United States Navy, the United States Coast Guard, and the National Oceanic and Atmospheric Administration (NOAA), provides sea ice analyses encompassing the "Arctic" and the "Antarctic". These analyses continue the data set established under our previous name, the Joint Ice Center. These atlases continue the near real-time integration of remotely sensed data and point observations and differ only in that the Arctic and Antarctic are split into two separate publications per hemisphere per year.

This publication is the 11th edition of the annual "Antarctic Sea Ice Atlas" published in hard copy format by the NIC. The atlas contains weekly charts depicting the sea ice extent and coverage in the Southern Hemisphere from the first week of January through December 1996.

The NIC uses a wide variety of data sources in the production of sea ice analyses. Table 1 lists the data sources used to produce the Antarctic weekly ice analyses contained in this publication. The line types used in the analyses provide metadata information with regard to sensor type. Solid lines depict boundaries derived from: point observations, Defense Meteorological Satellite Program Operational Line Scan (DMSP OLS) and NOAA Advanced Very High-Resolution Radiometer (AVHRR) data. Dash-dash-dotted line depicts boundaries derived from DMSP Special Sensor Microwave Imager (SSM/I), and dashed lines depict boundaries derived from forecast models and climatology.

Please direct questions or comments to the NIC Liaison Branch, at phone number (301) 457-5303 extension 311 or 303, facsimile number (301) 457-5300, or electronic mail address: lialison@natice.noaa.gov

Atlas addendum: This publication is intended to serve as an interim solution, while transitioning to distribution via CD-ROM. The purpose of this atlas is to make all National Ice Center (NIC) sea ice charts available to customers using NIC designated archive centers. By fall 1999, it is anticipated that NIC will complete and distribute Arctic/Antarctic ice atlases on CD-ROM for 1995, 1996, 1997 and 1998. It should be noted that the charts presented in this atlas have been drawn by hand for operational use. Corrections to "hand annotations" are visible on some of the charts in the atlas.

| From | To | Sensor Platform | Sensor and Type | Spectral Region | Resolution | Coverage |
|-------|-------|-----------------------|----------------------------|--|--|--------------------|
| 01-96 | 12-96 | DMSP F-10, 11, 12, 13 | OLS Fine: VIS IR SSM/I | 0.4 to 1.1 μ m 10.2 to 12.8 μ m 19.35 and 37GHz | 0.55 km 25 km | 3,012km 3,012km |
| 01-96 | 12-96 | NOAA 12, 14 | AVHRR: HRPT/LAC VIS NIR IR | 0.58 to 0.68 μ m 0.72 to 1.10 μ m 3.55 to 3.93 μ m | 1.1km at nadir; 2.5km at swath edge | 4,000km |

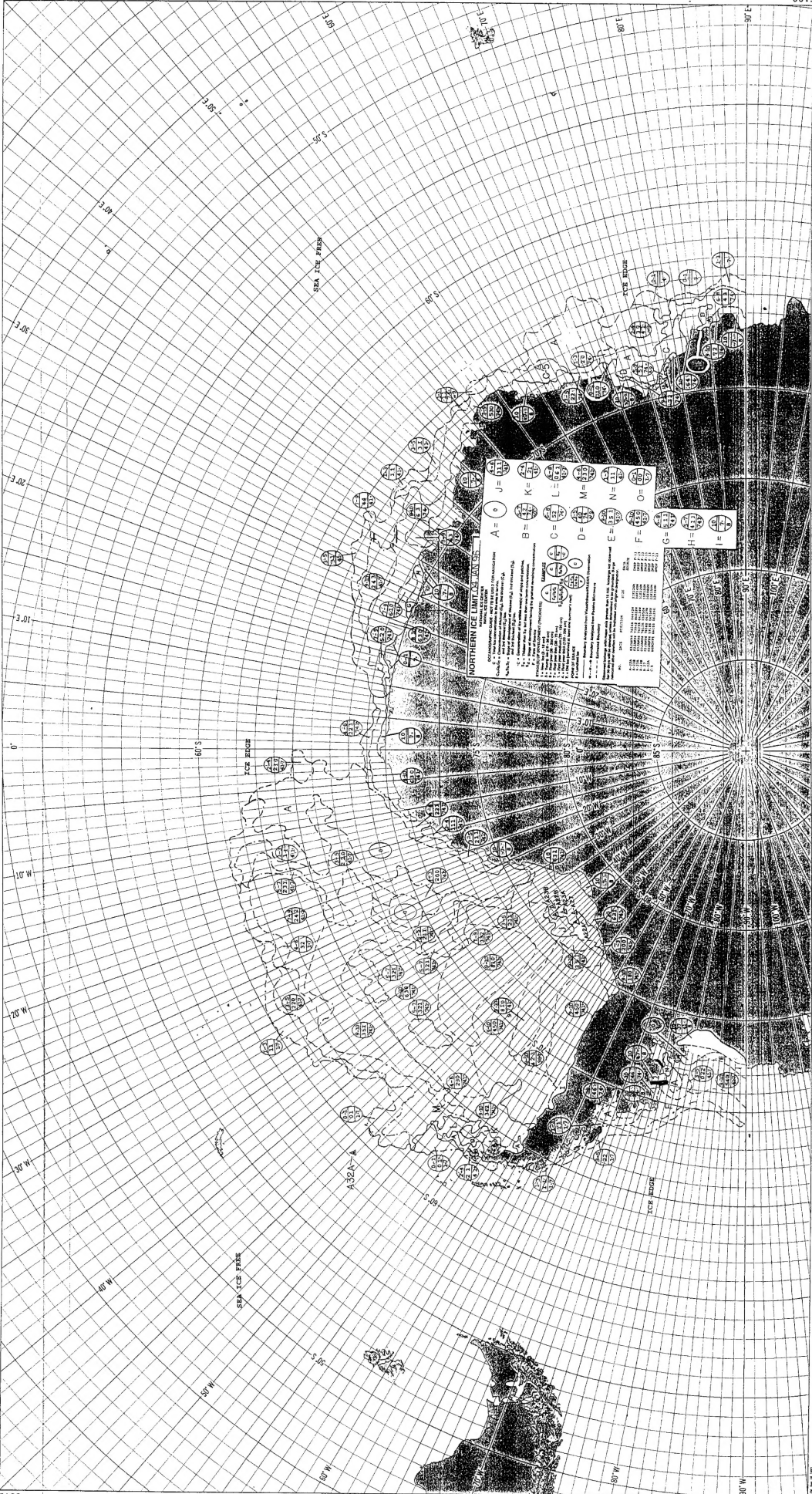
TABLE 1. 1996 Antarctic Satellite Data Sources

Abbreviations and Acronyms:

AVHRR- Advanced Very High Resolution Radiometer
cm- centimeter
GHz- Gigahertz
HRPT- High Resolution Picture transmission
IR- Infrared
km- kilometer
LAC- Local Area Coverage
NIR- Near Infrared
OLS- Operational Linescan System
SSM/I- Special Sensor Microwave Imager
 μ m- micrometer
VIS- Visible

Antarctica satellite composite courtesy of United States Geological Survey, Flagstaff, AZ.
(<http://TerraWeb.wr.usgs.gov/TRS/projects/Antarctica/color/images>).

Prepared under the authority of Commander, Naval Oceanography Command, Stennis Space Center, MS 39529-5000



NORTH ATLANTIC OCEAN

NAVIGATION

1. Symbols for Navigational Aids

2. Symbols for Obstructions

3. Symbols for Shallow Water

4. Symbols for Ice

5. Symbols for Weather

6. Symbols for Currents

7. Symbols for Tides

8. Symbols for Other Information

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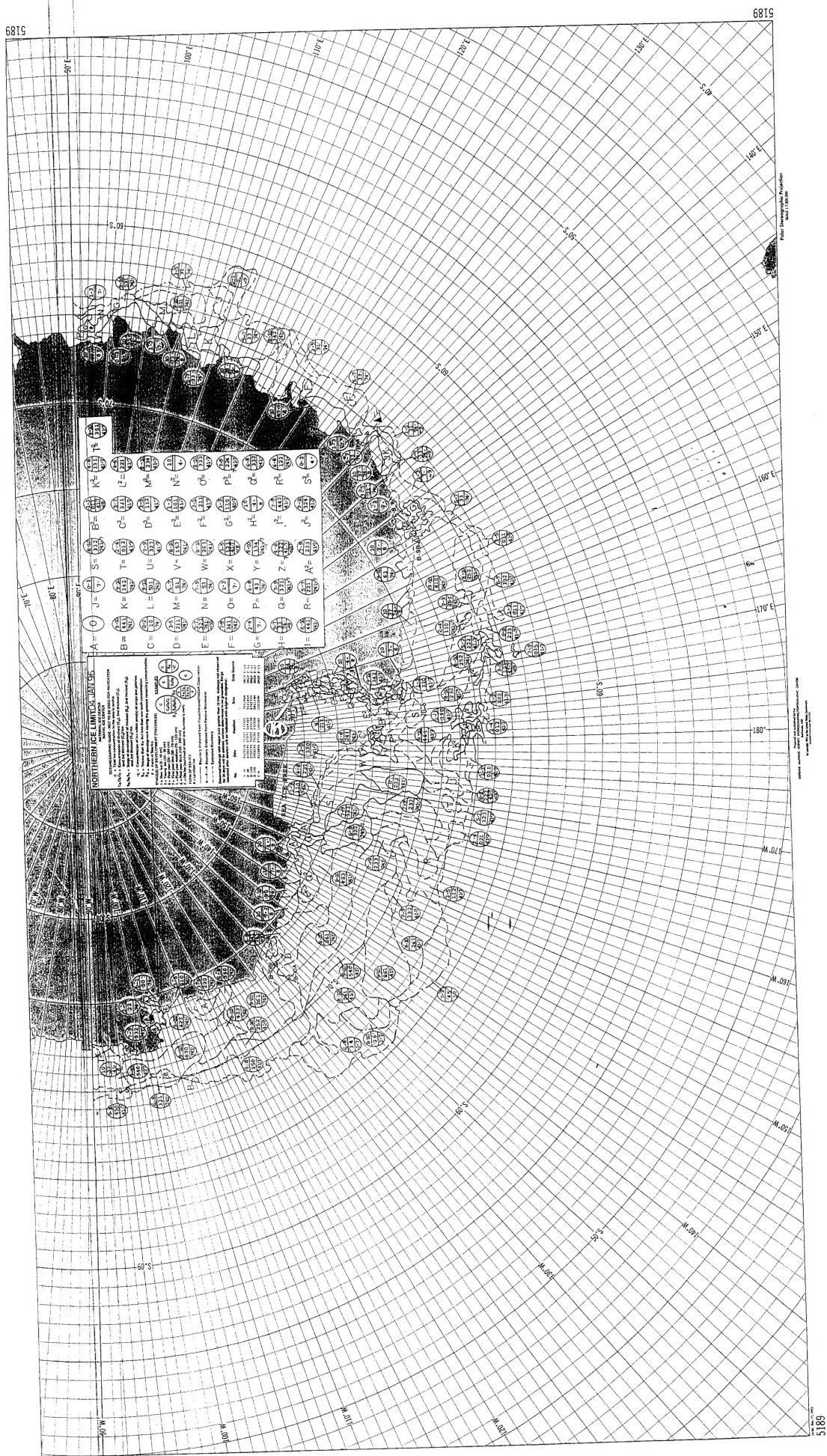
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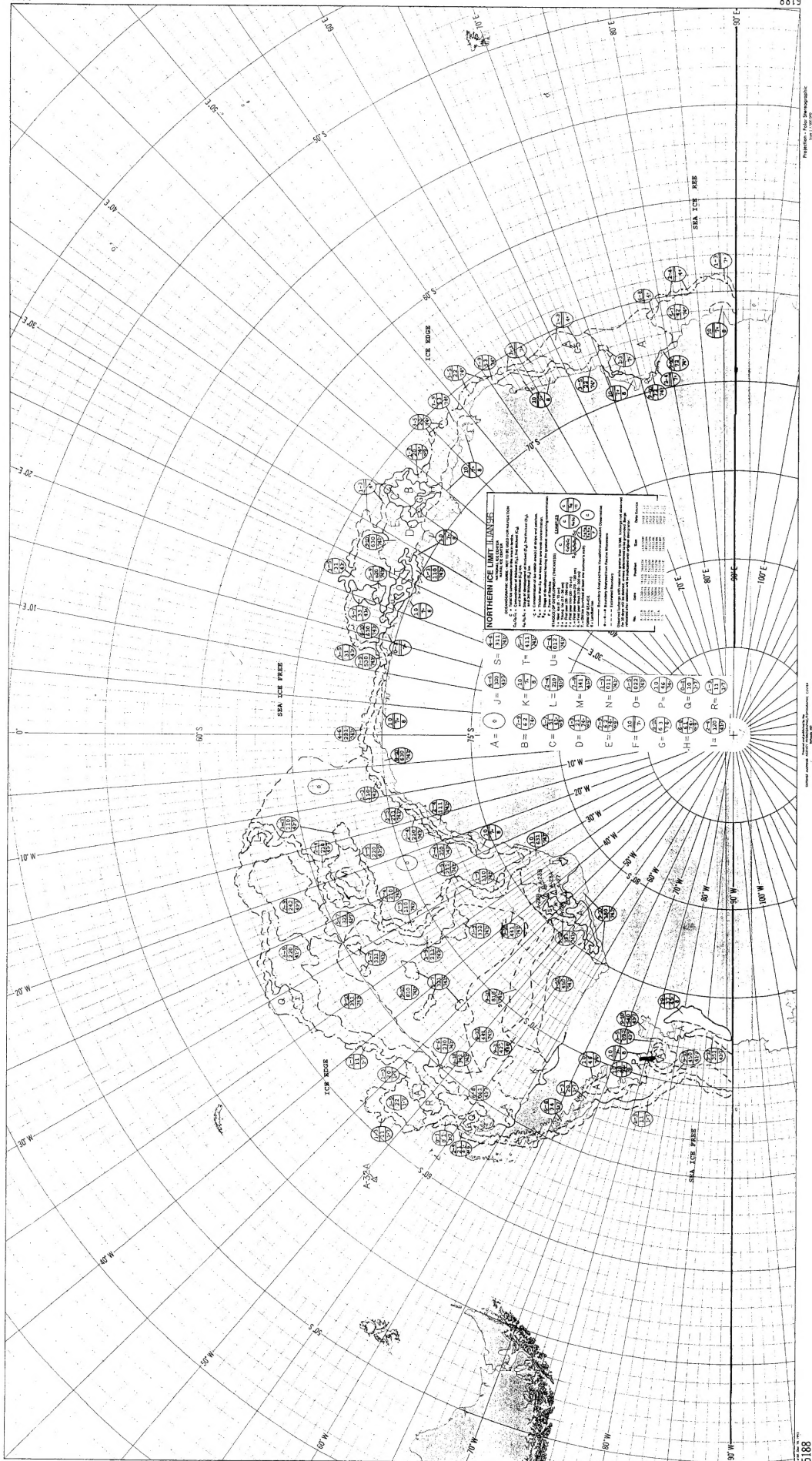
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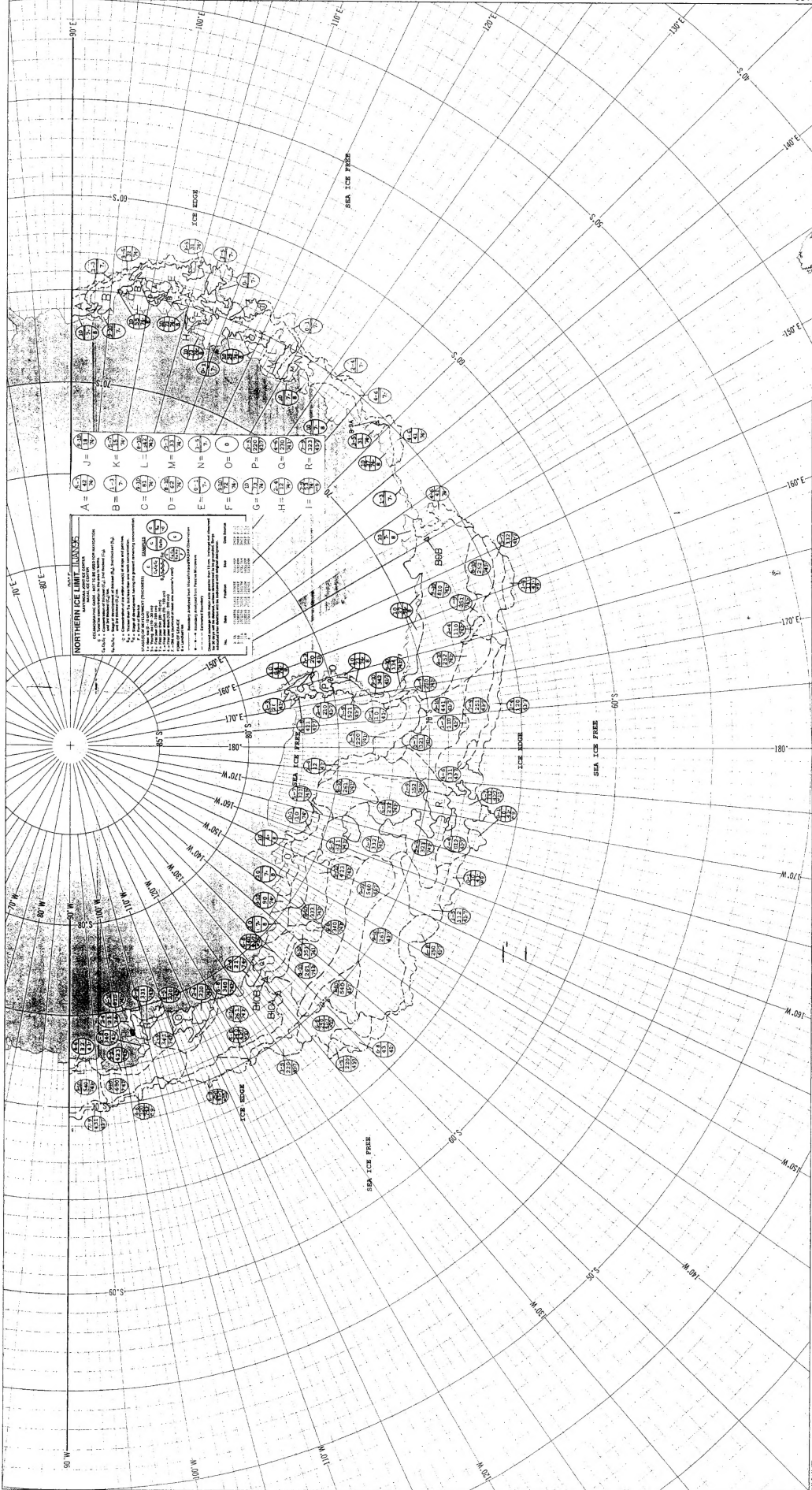
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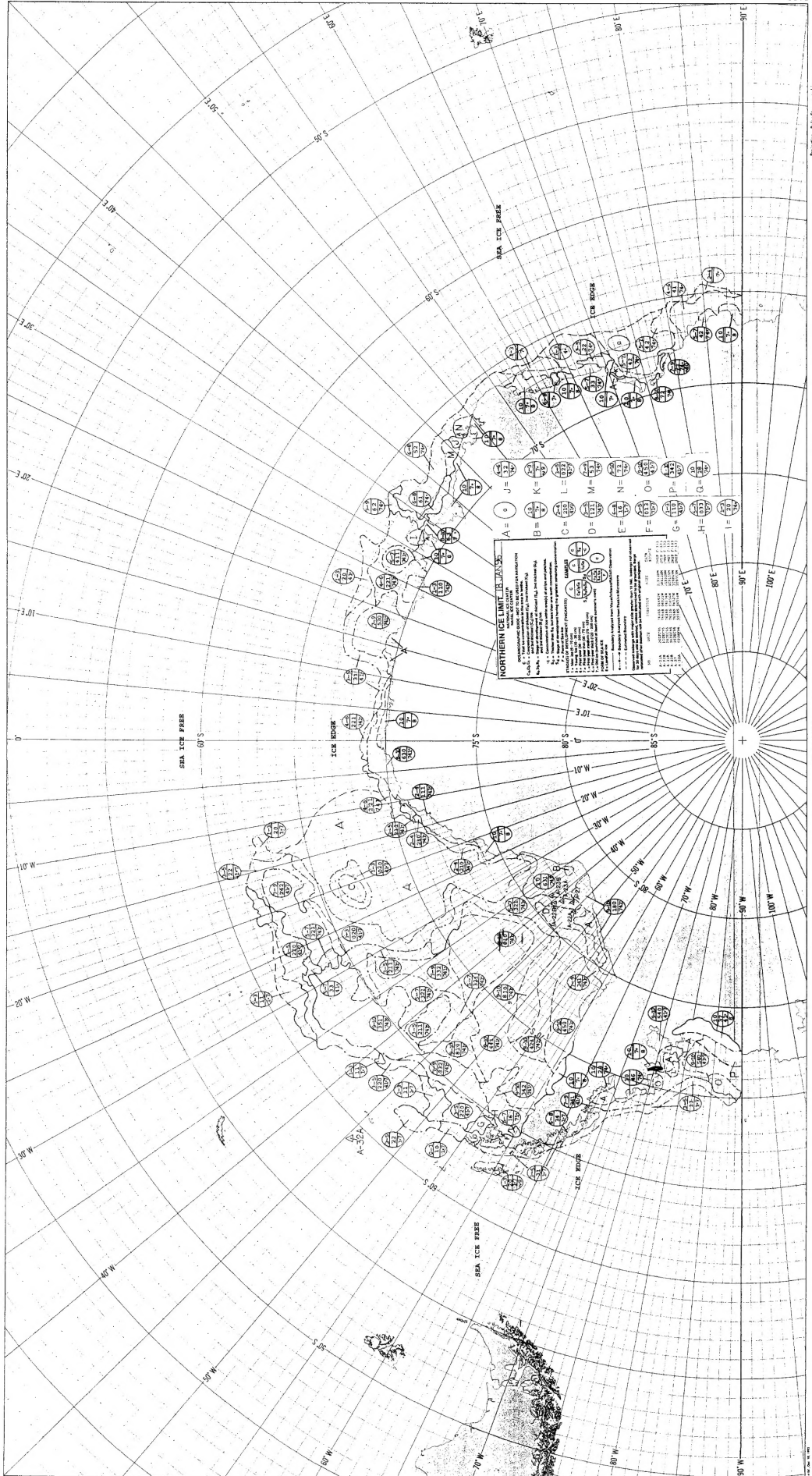
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100. Symbols for Other Information



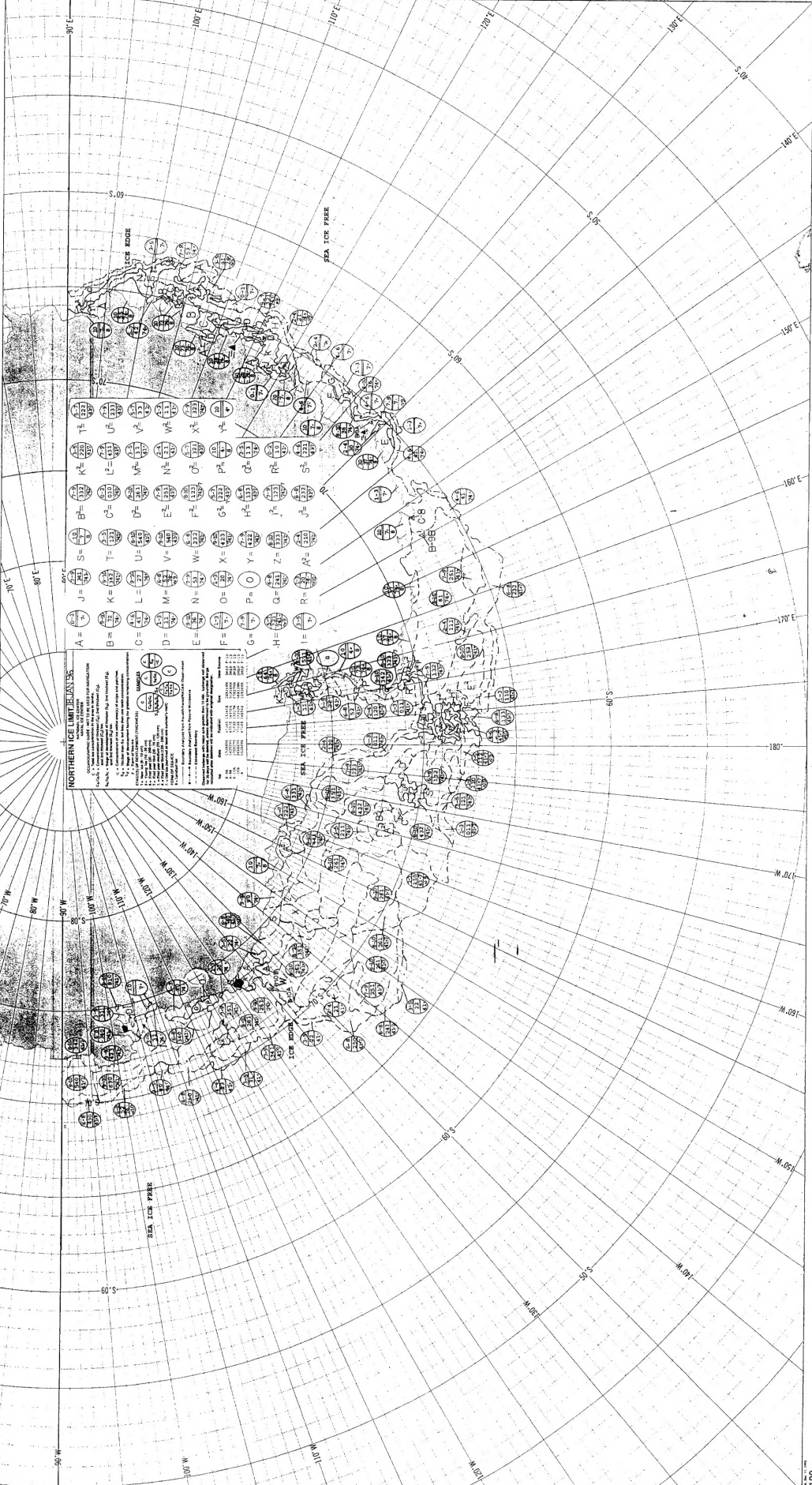


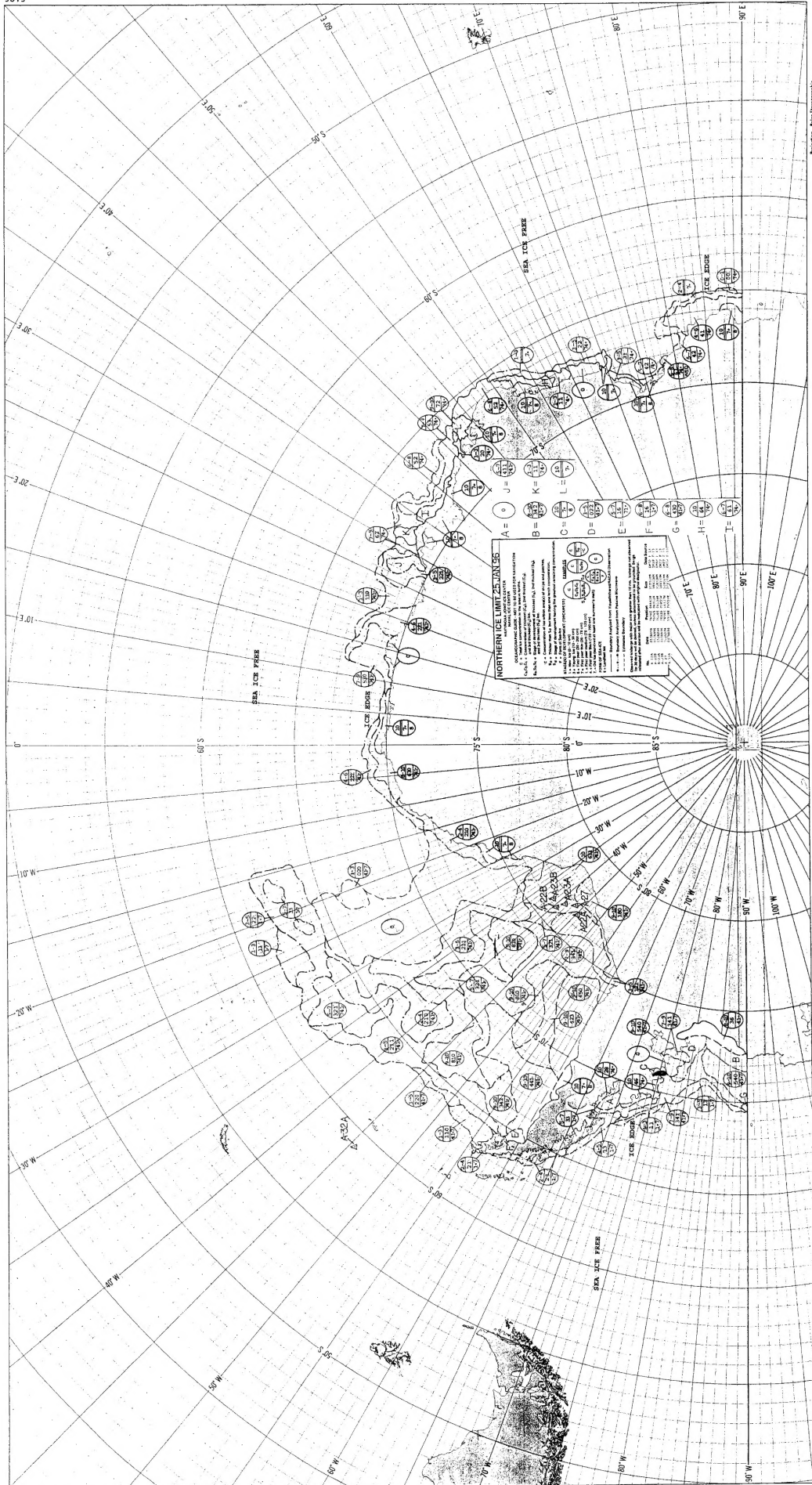


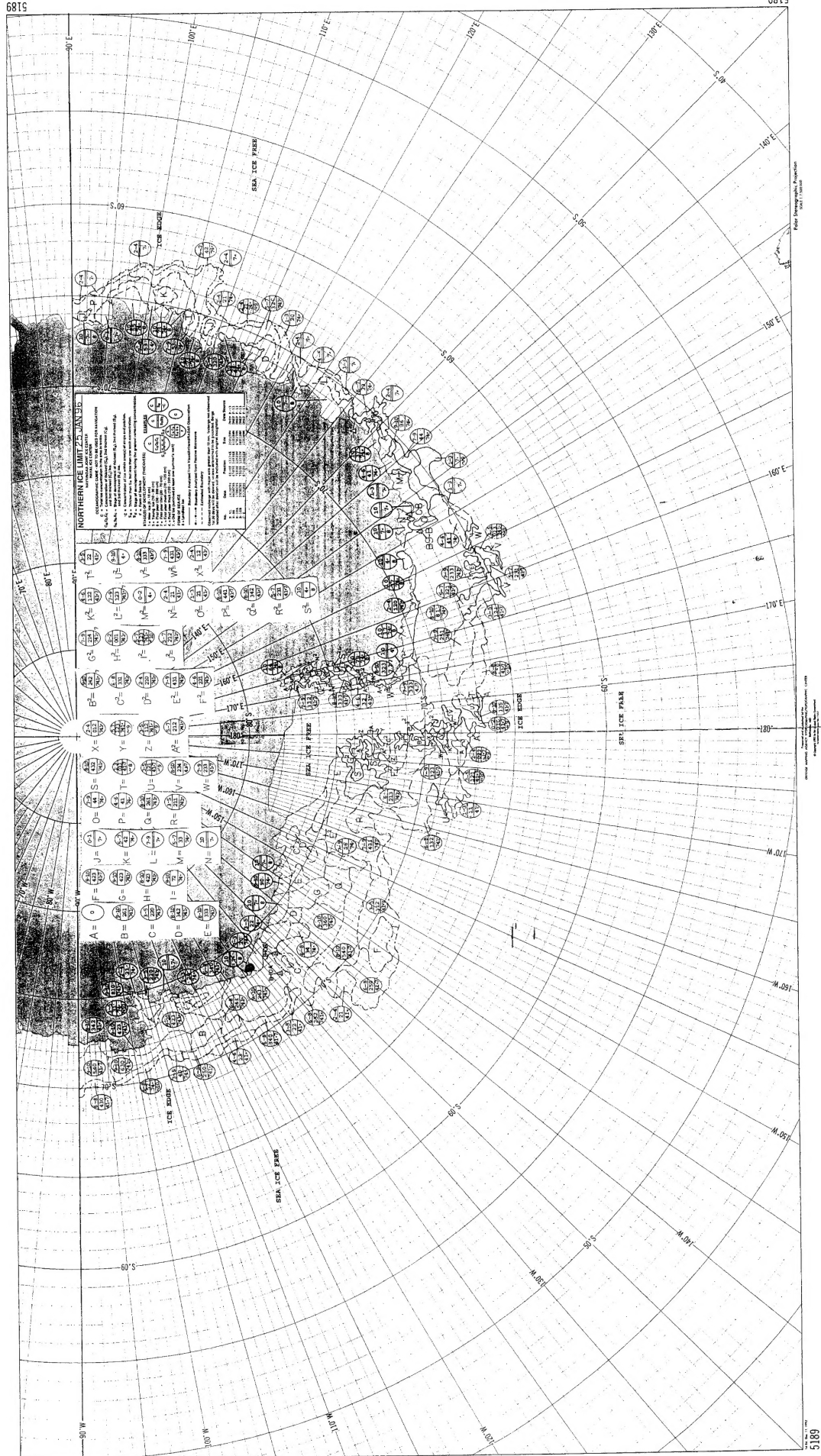


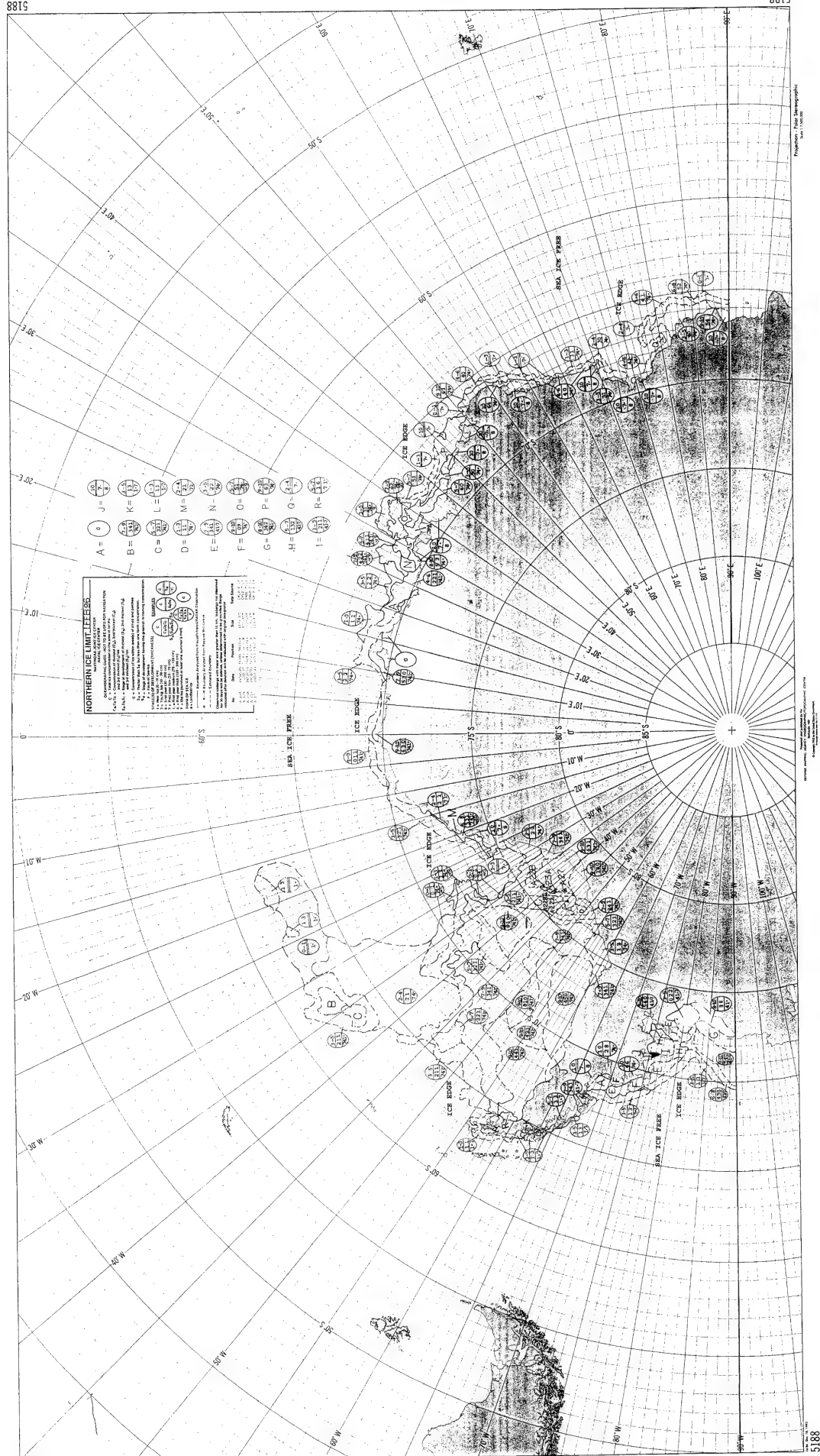
Published by the Hydrographic Office, Washington, D.C.

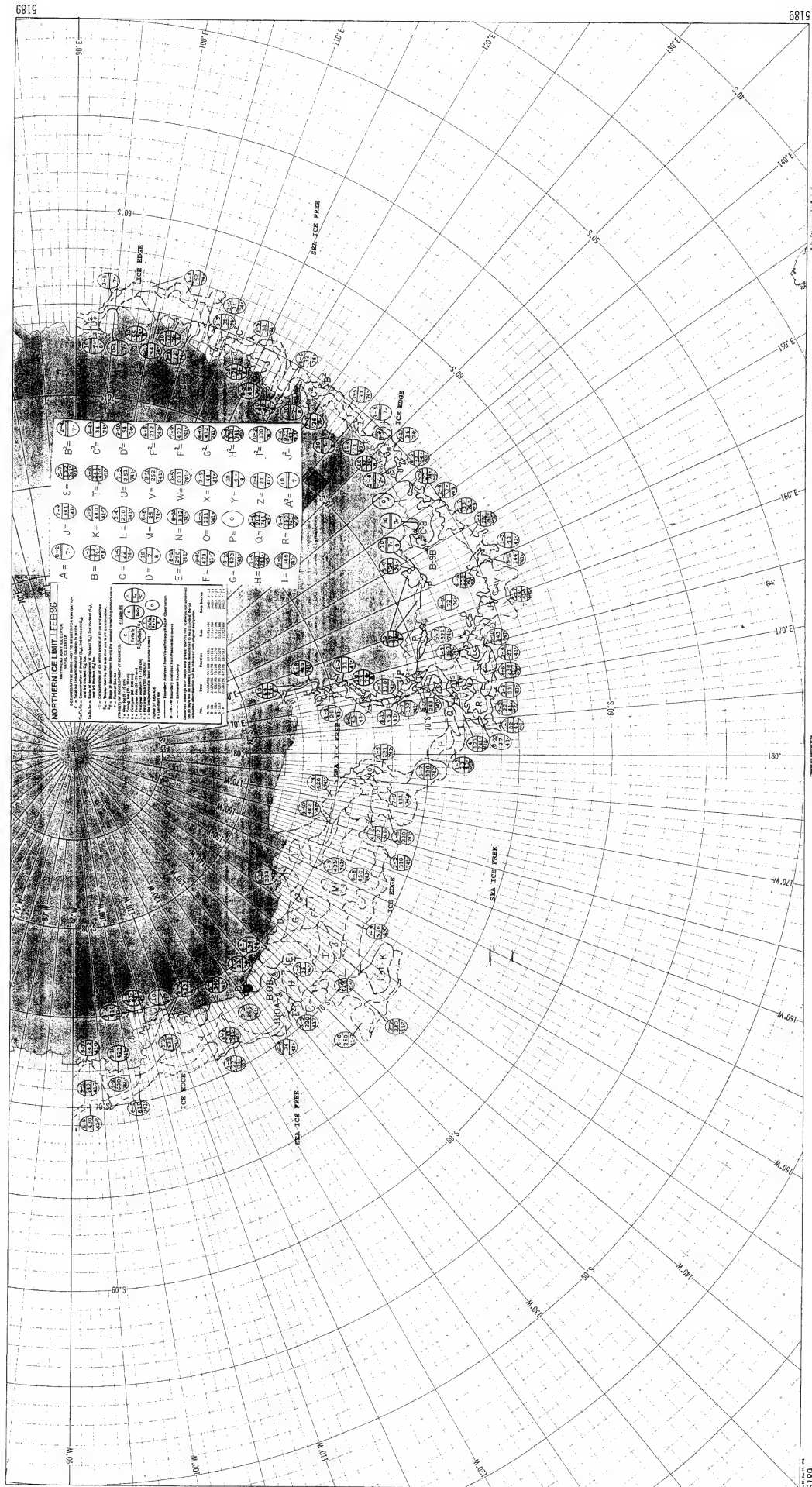
Scale of Nautical Miles

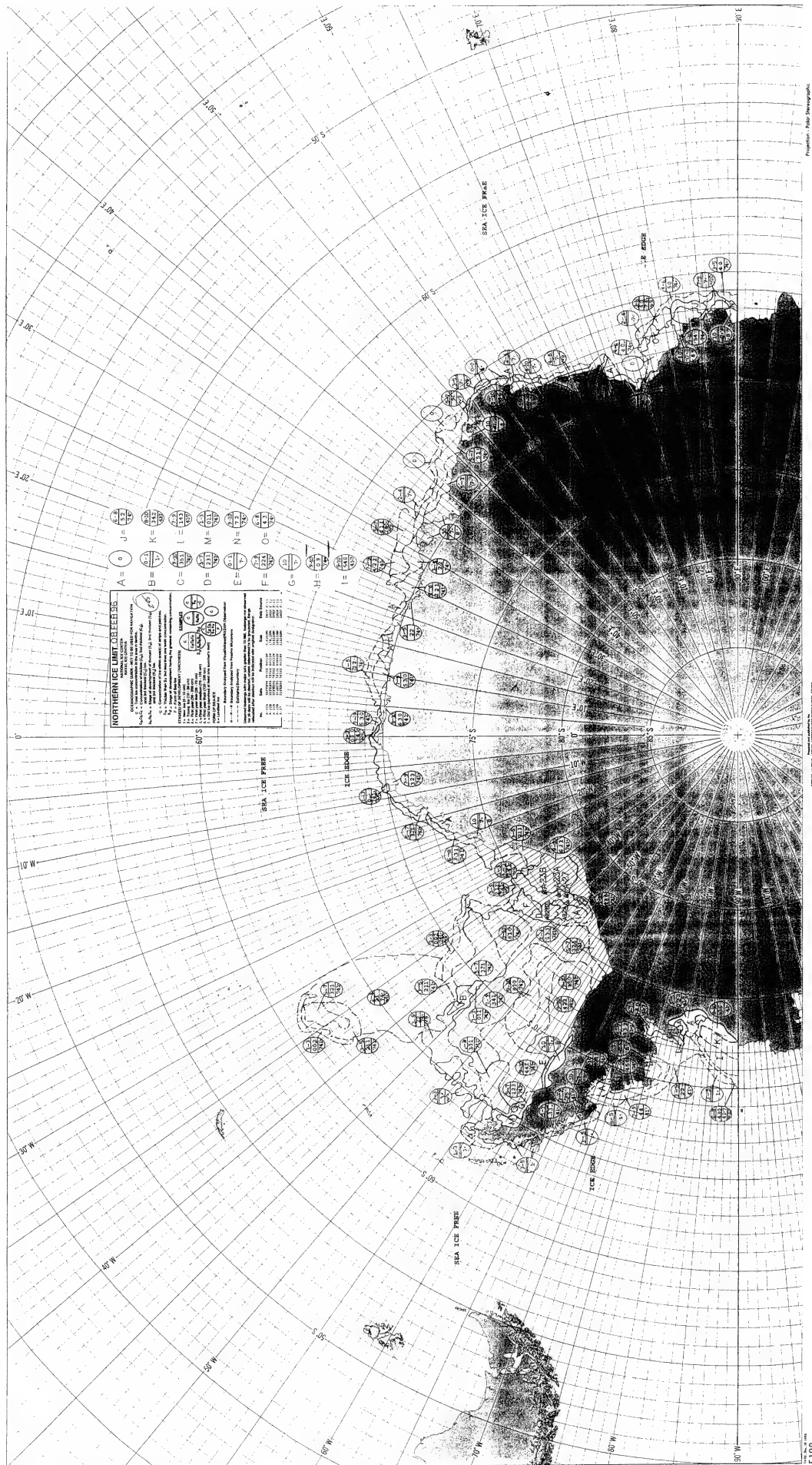


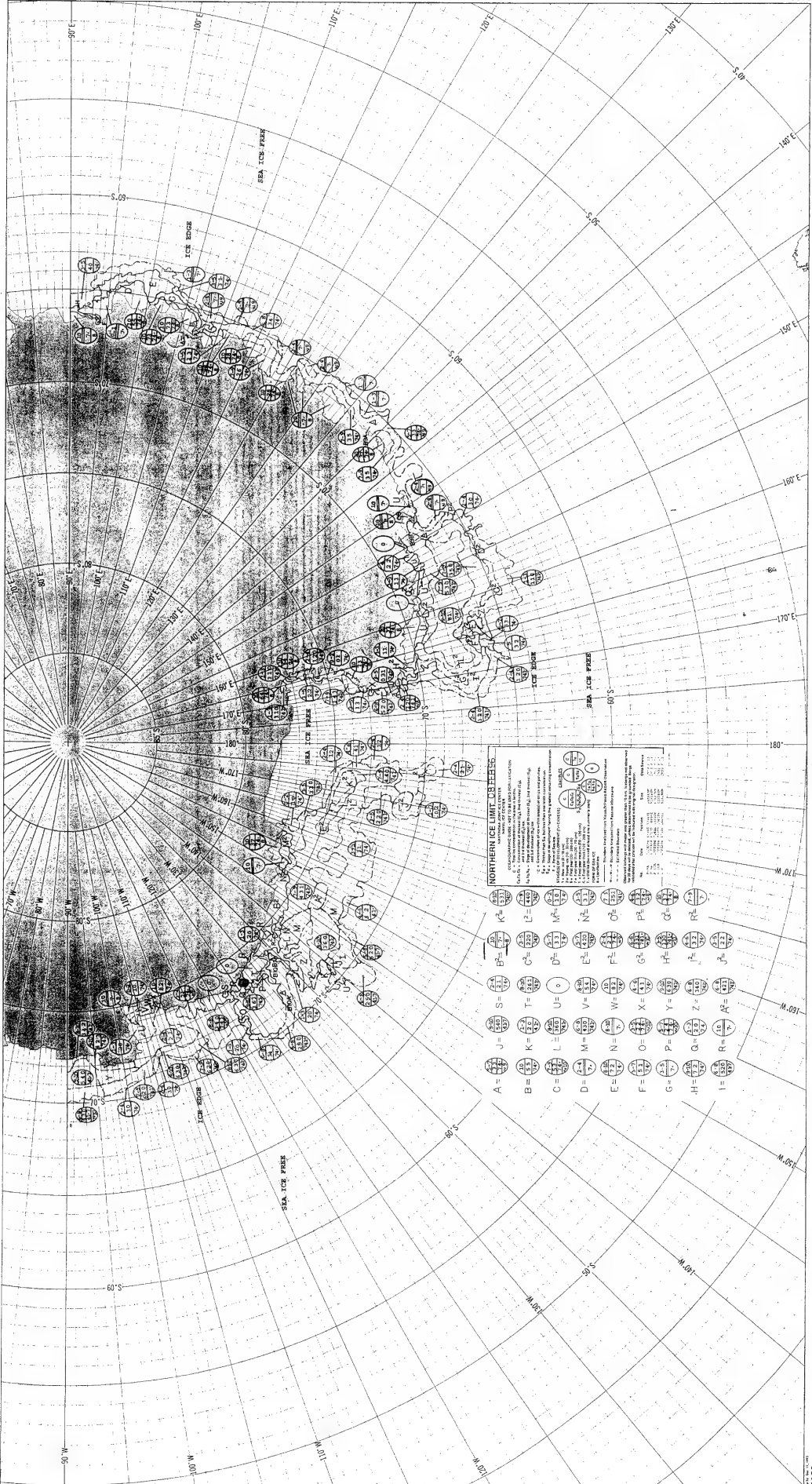


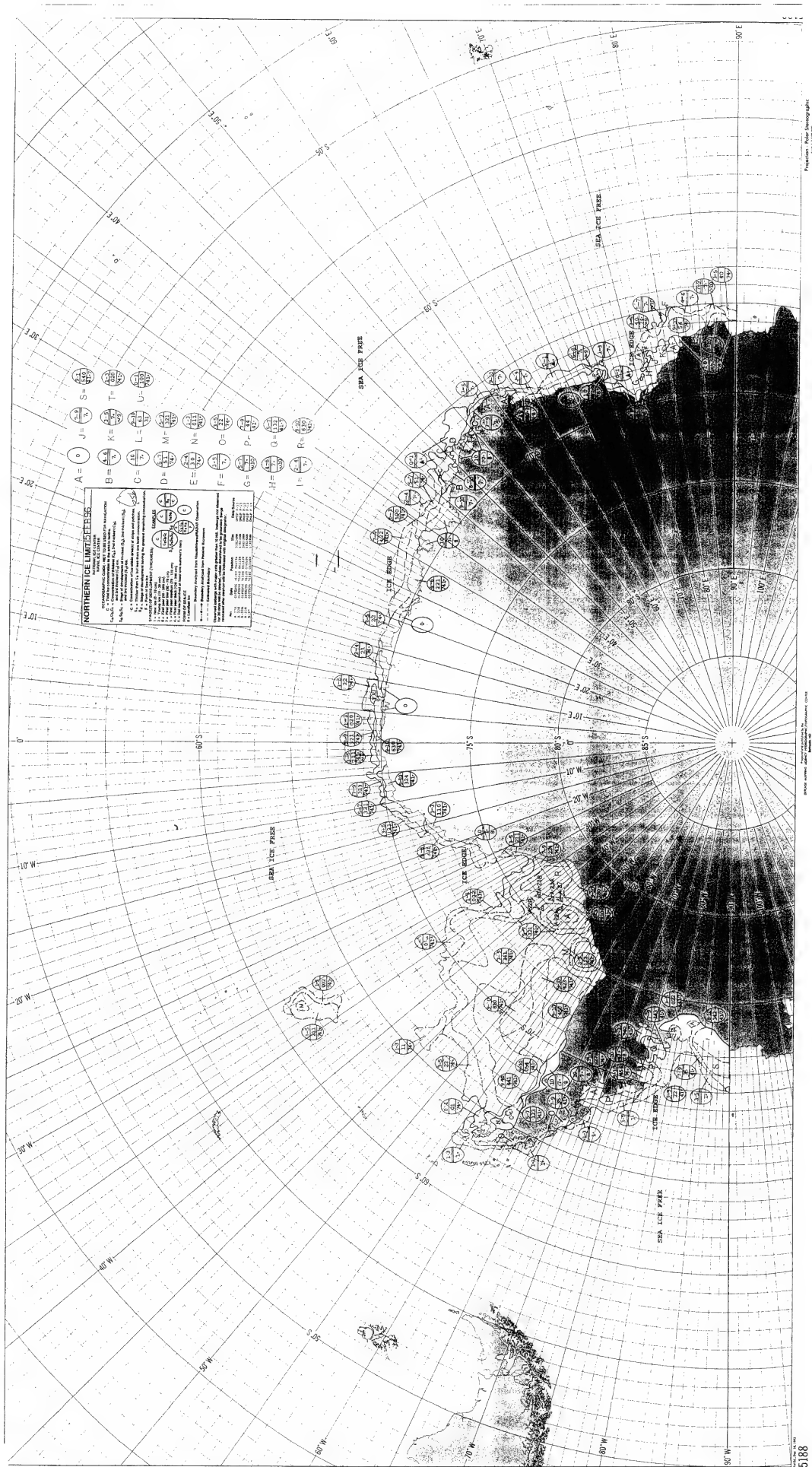


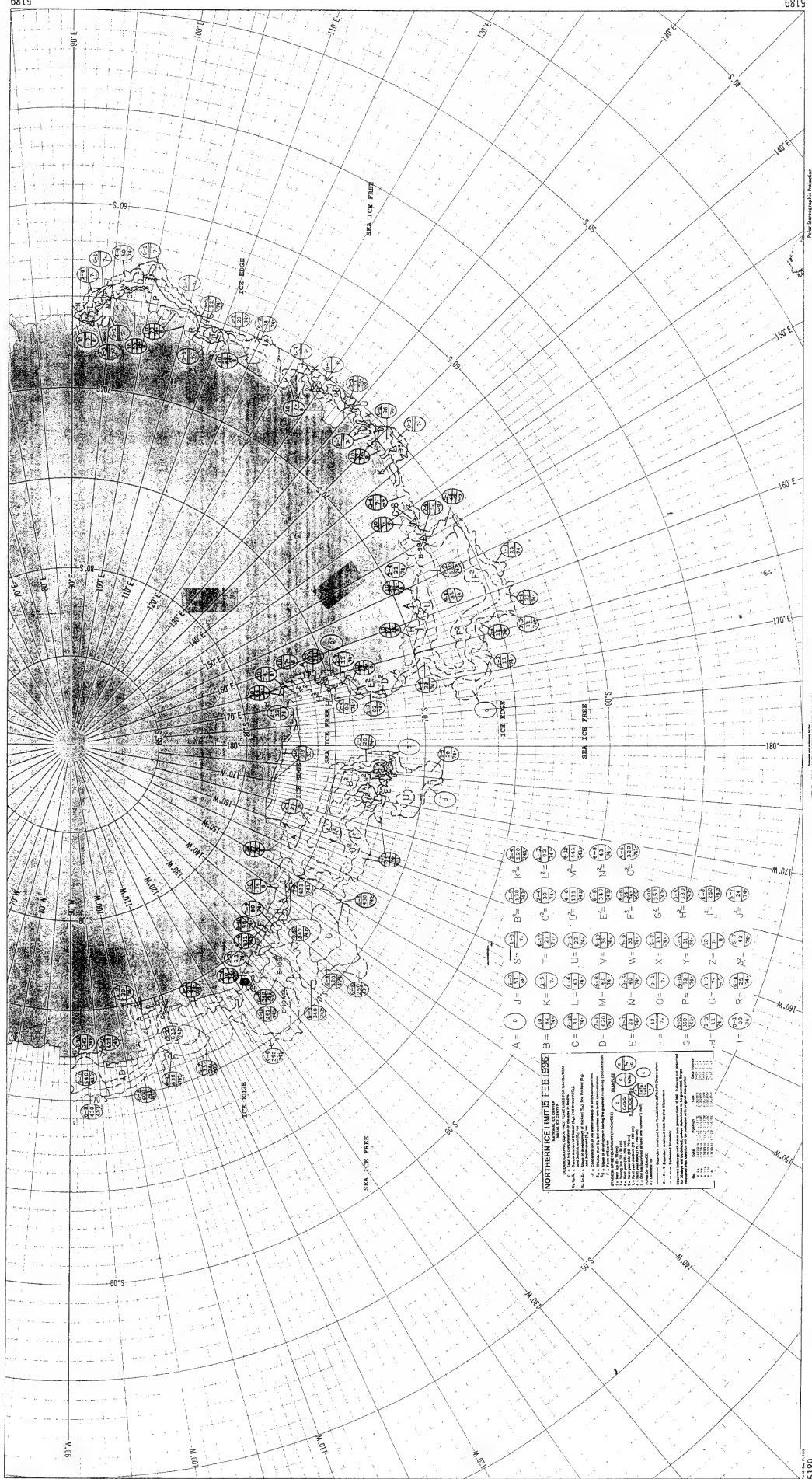












NORTHERN ICE LIMIT FEB 1955

NAVY DEPARTMENT
NAVY OFFICE
NAVY DEPARTMENT
NAVY OFFICE

1. This chart shows the northern limit of sea ice in the Arctic region for the month of February 1955. The limit is based on the latest available information from the Navy's ice reconnaissance operations.

2. The limit is shown as a solid line, with the area to the north of the line being ice-free. The area to the south of the line is shaded, indicating the presence of sea ice.

3. The limit is based on the latest available information from the Navy's ice reconnaissance operations. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

4. The limit is shown for the month of February 1955. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

5. The limit is based on the latest available information from the Navy's ice reconnaissance operations. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

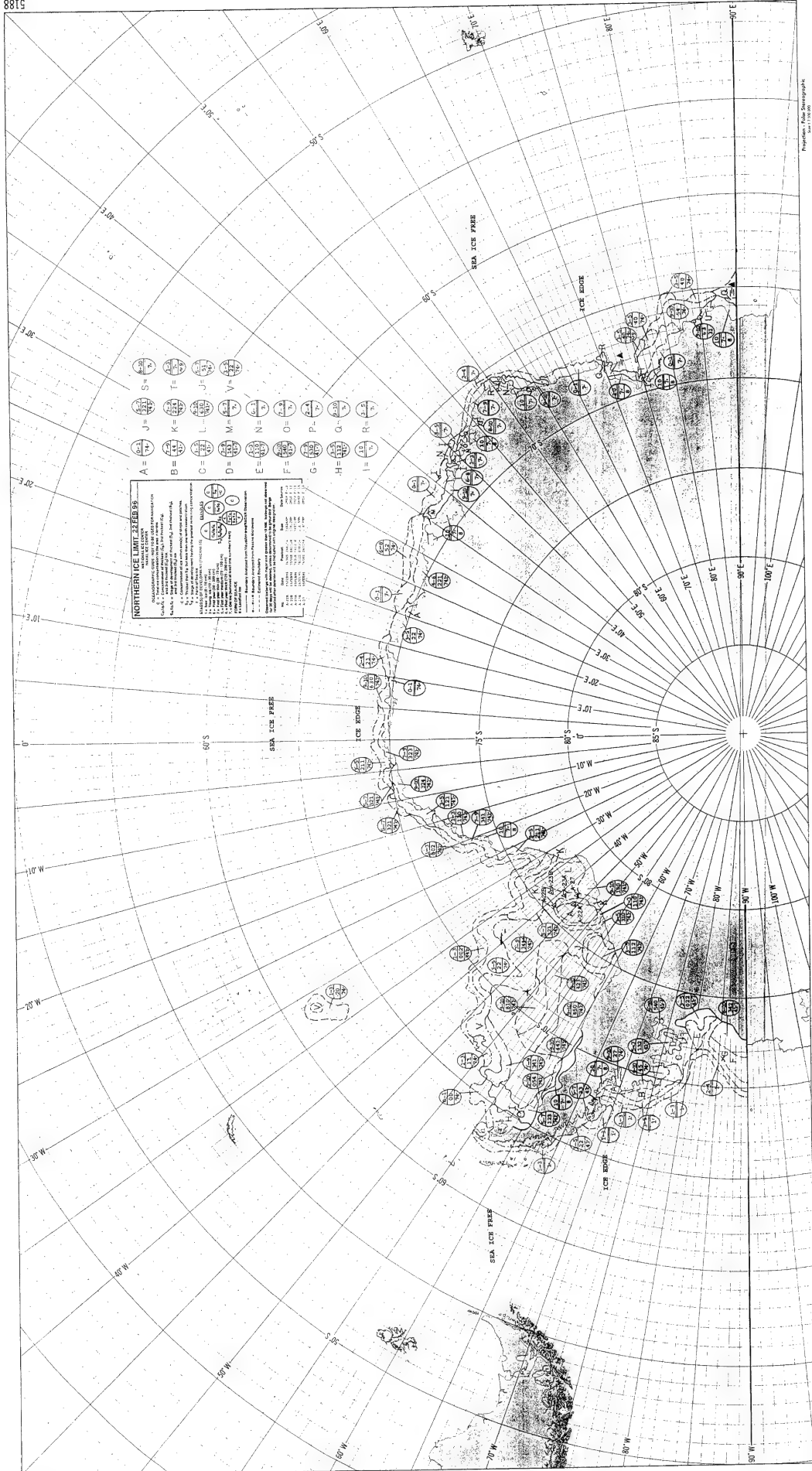
6. The limit is shown for the month of February 1955. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

7. The limit is based on the latest available information from the Navy's ice reconnaissance operations. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

8. The limit is shown for the month of February 1955. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

9. The limit is based on the latest available information from the Navy's ice reconnaissance operations. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

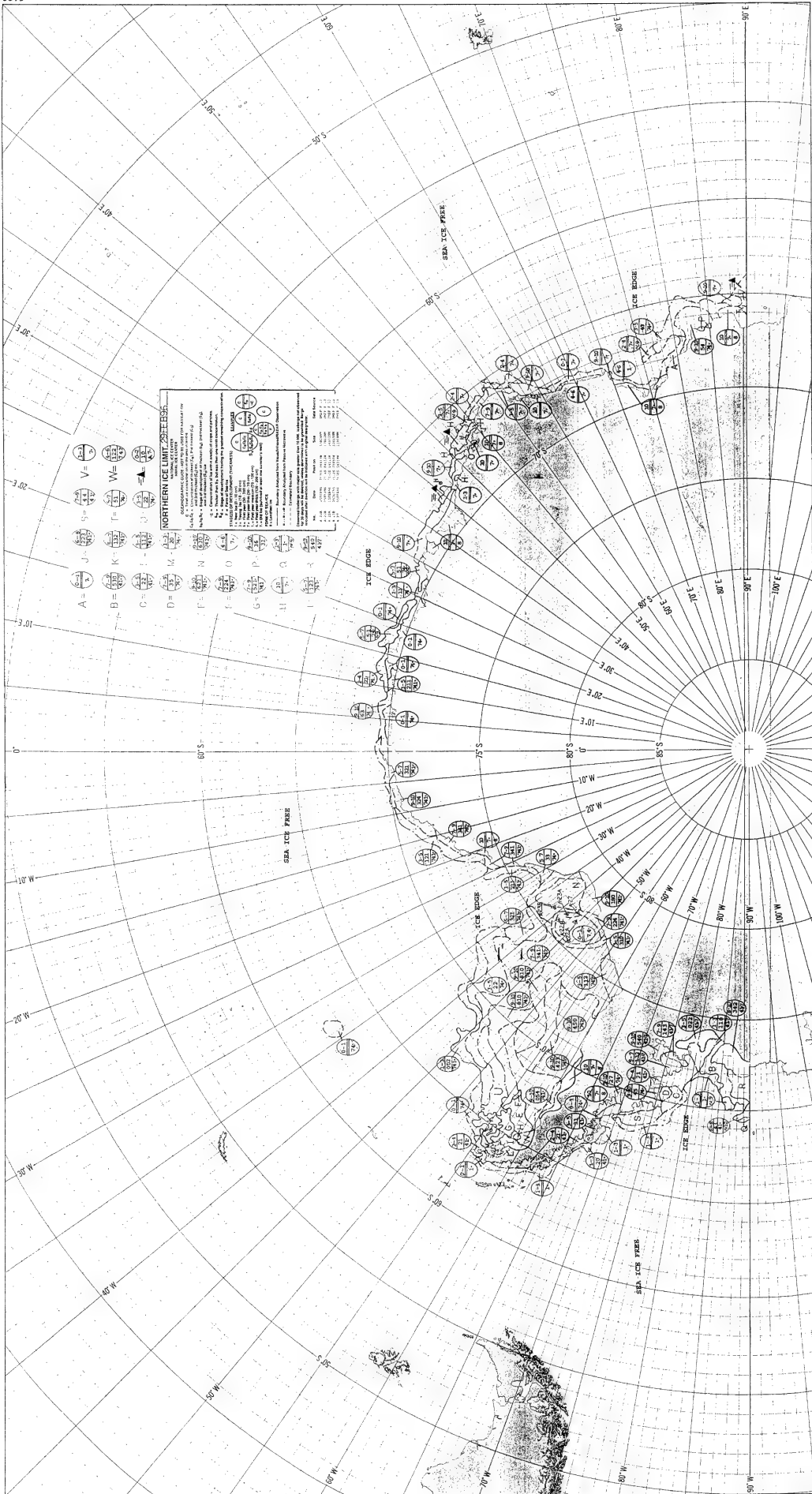
10. The limit is shown for the month of February 1955. It is not a guarantee of the actual limit, as the limit may change due to weather conditions or other factors.

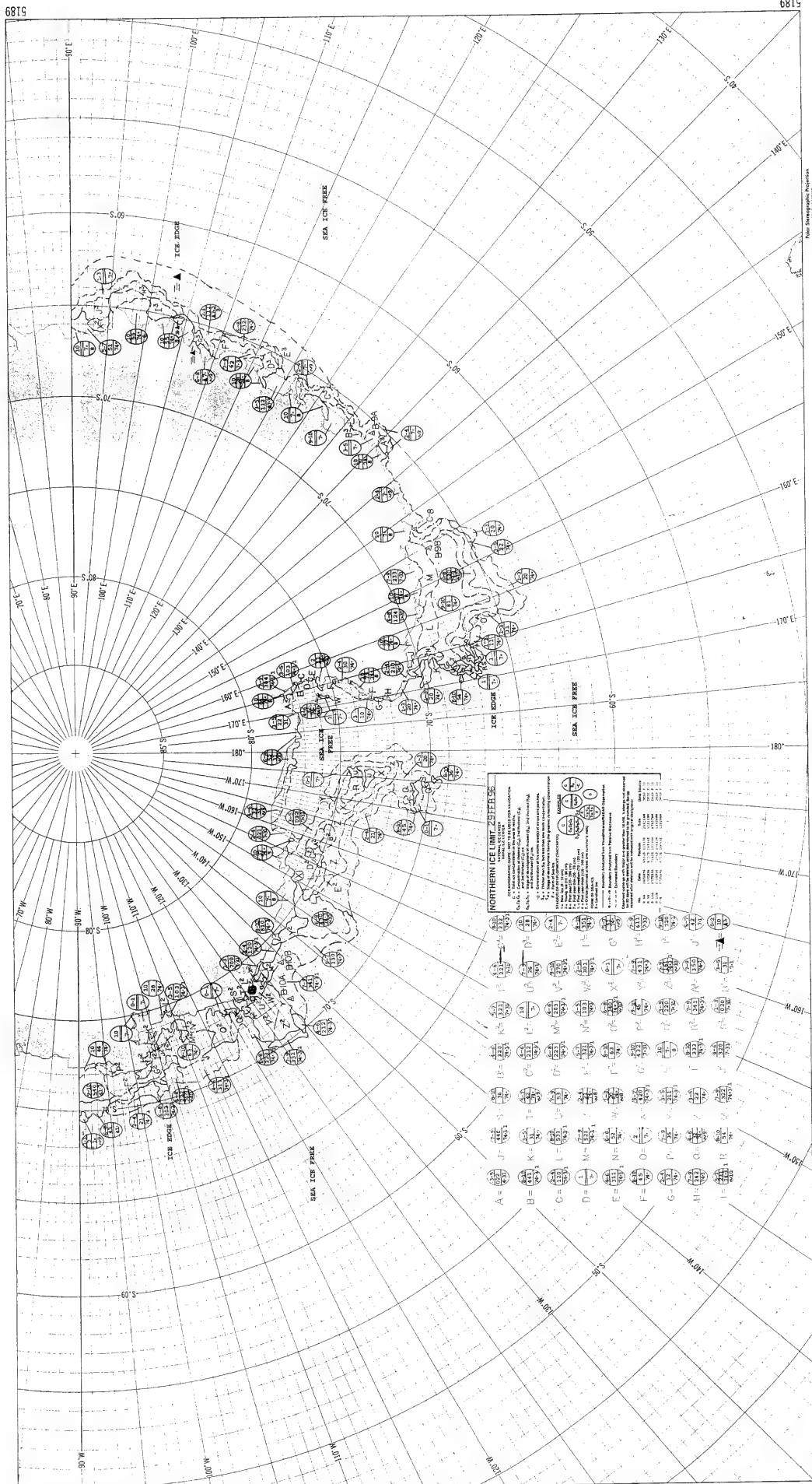


Projection: Mercator
Scale: 1:100,000

Source: NOAA Nautical Charts
Revised: 2000

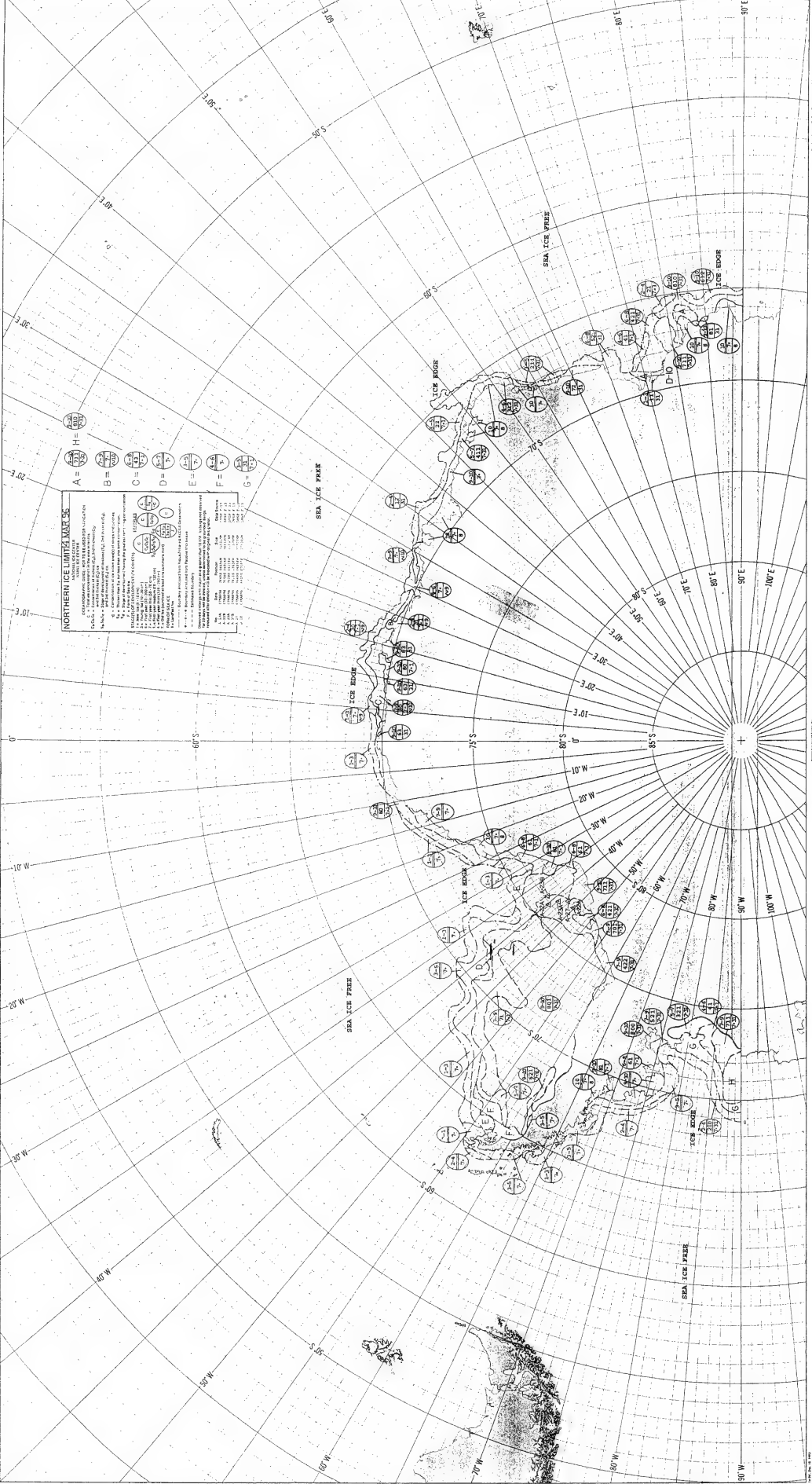


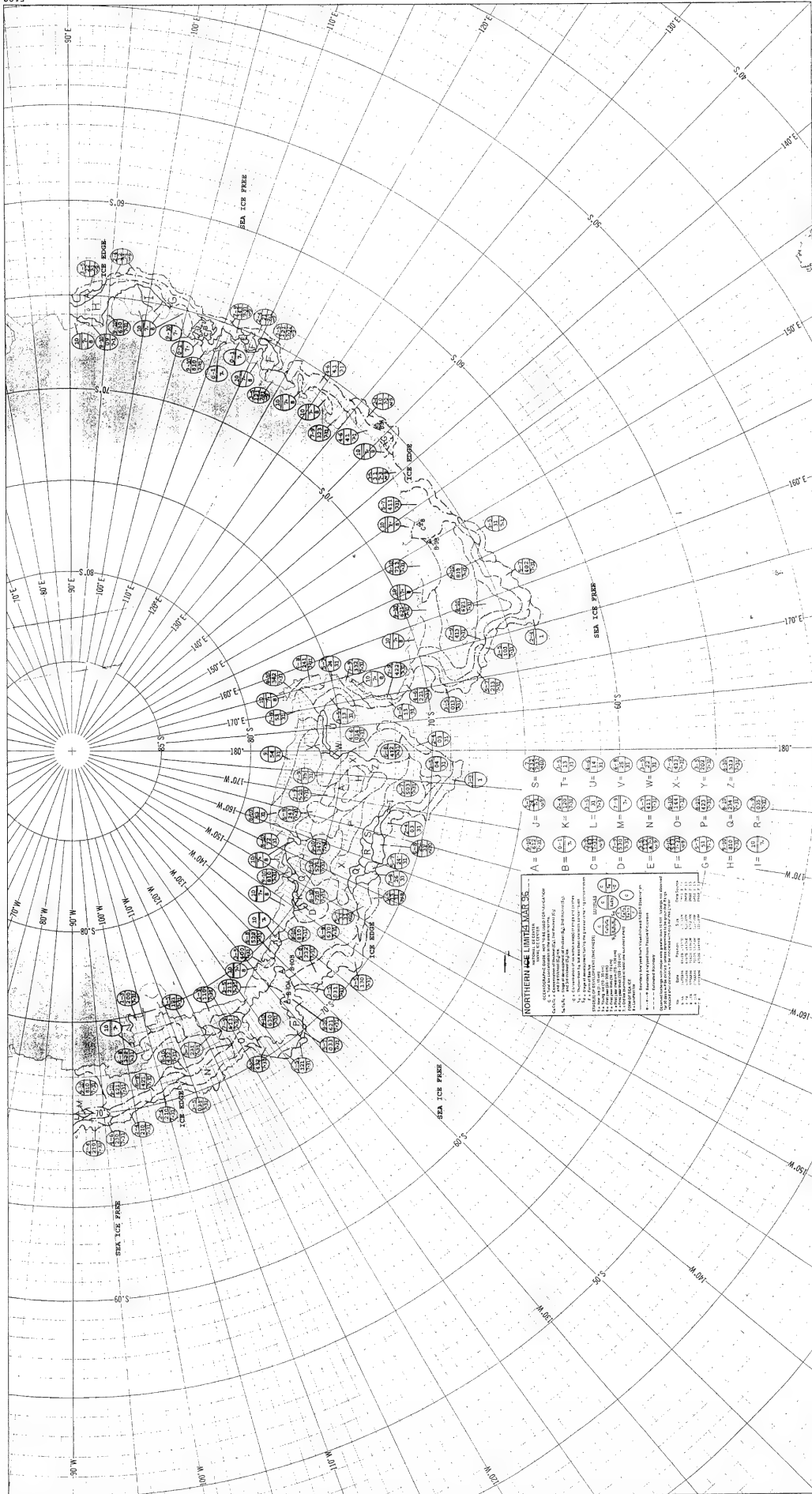












NORTHERN ICE LIMIT MAR 30

UNITED STATES GOVERNMENT
NAVY DEPARTMENT
OFFICE OF THE CHIEF OF NAUTICAL INQUIRY
WASHINGTON, D. C.

1. This chart shows the position of the ice limit for the month of March, 1930, as determined by the U. S. Navy's Arctic expeditions. The limit is shown by a line of dots, each of which is a circle containing a letter and a number. The letters represent the names of the ships or the names of the commanders of the expeditions, and the numbers represent the dates of the observations. The limit is shown for the entire Arctic region, from the North Pole to the coast of Siberia and Alaska.

2. The chart is a polar projection, with the North Pole at the center. The lines of latitude and longitude are shown as concentric circles and radial lines, respectively. The scale of the chart is 1 inch = 100 miles.

3. The chart is divided into four quadrants by the lines of 0 and 180 degrees longitude. The quadrants are labeled as follows:

- Quadrant I: 0 to 90 degrees longitude, 0 to 90 degrees latitude.
- Quadrant II: 90 to 180 degrees longitude, 0 to 90 degrees latitude.
- Quadrant III: 180 to 270 degrees longitude, 0 to 90 degrees latitude.
- Quadrant IV: 270 to 360 degrees longitude, 0 to 90 degrees latitude.

4. The chart is a reproduction of the original chart, which was published by the U. S. Navy's Arctic expeditions. The original chart was published in 1930, and is now in the public domain.

5. The chart is a valuable source of information for the study of the Arctic region, and for the determination of the limits of the sea ice. It is also a valuable source of information for the study of the history of the Arctic expeditions.

6. The chart is a reproduction of the original chart, which was published by the U. S. Navy's Arctic expeditions. The original chart was published in 1930, and is now in the public domain.

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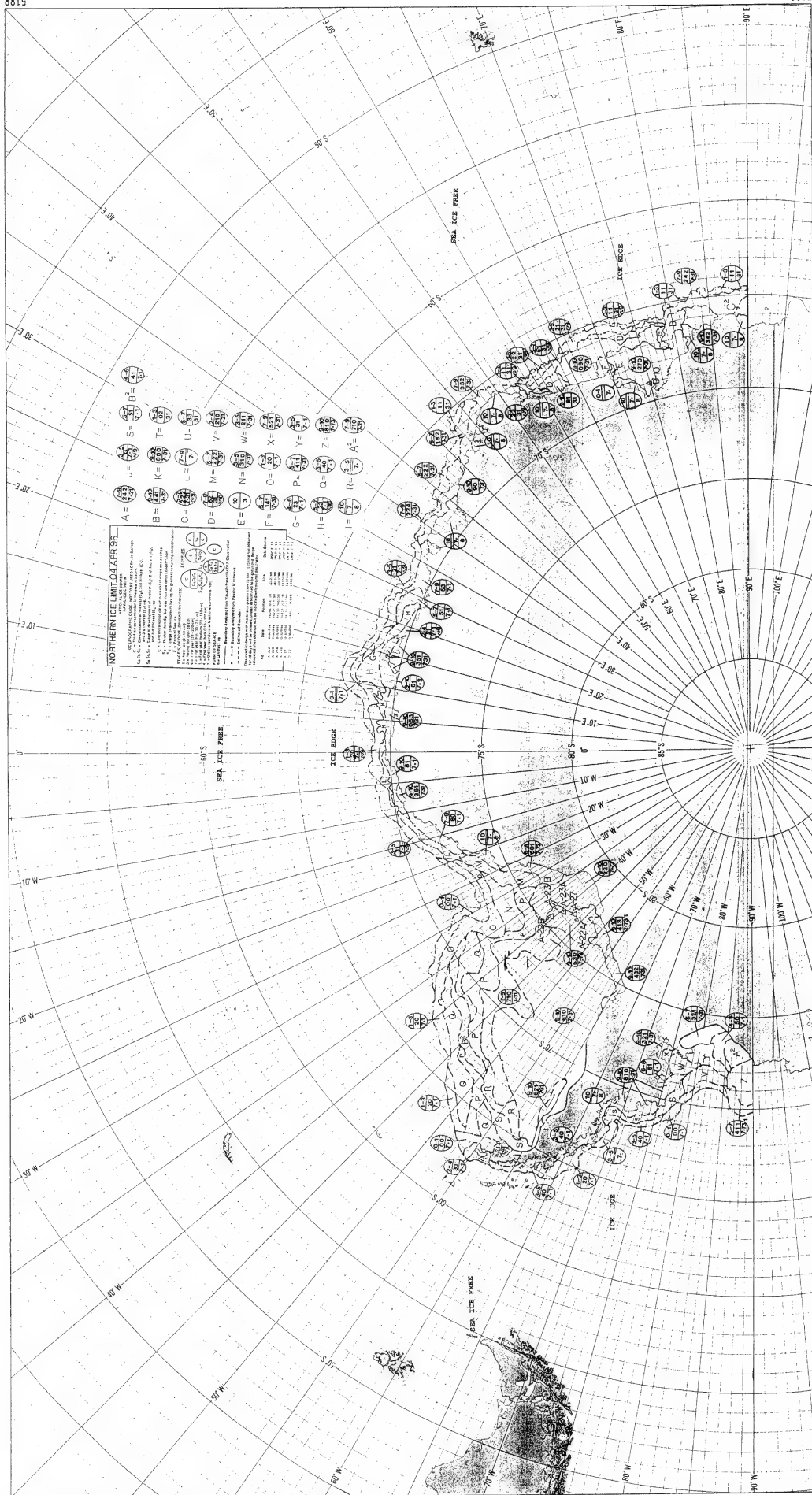
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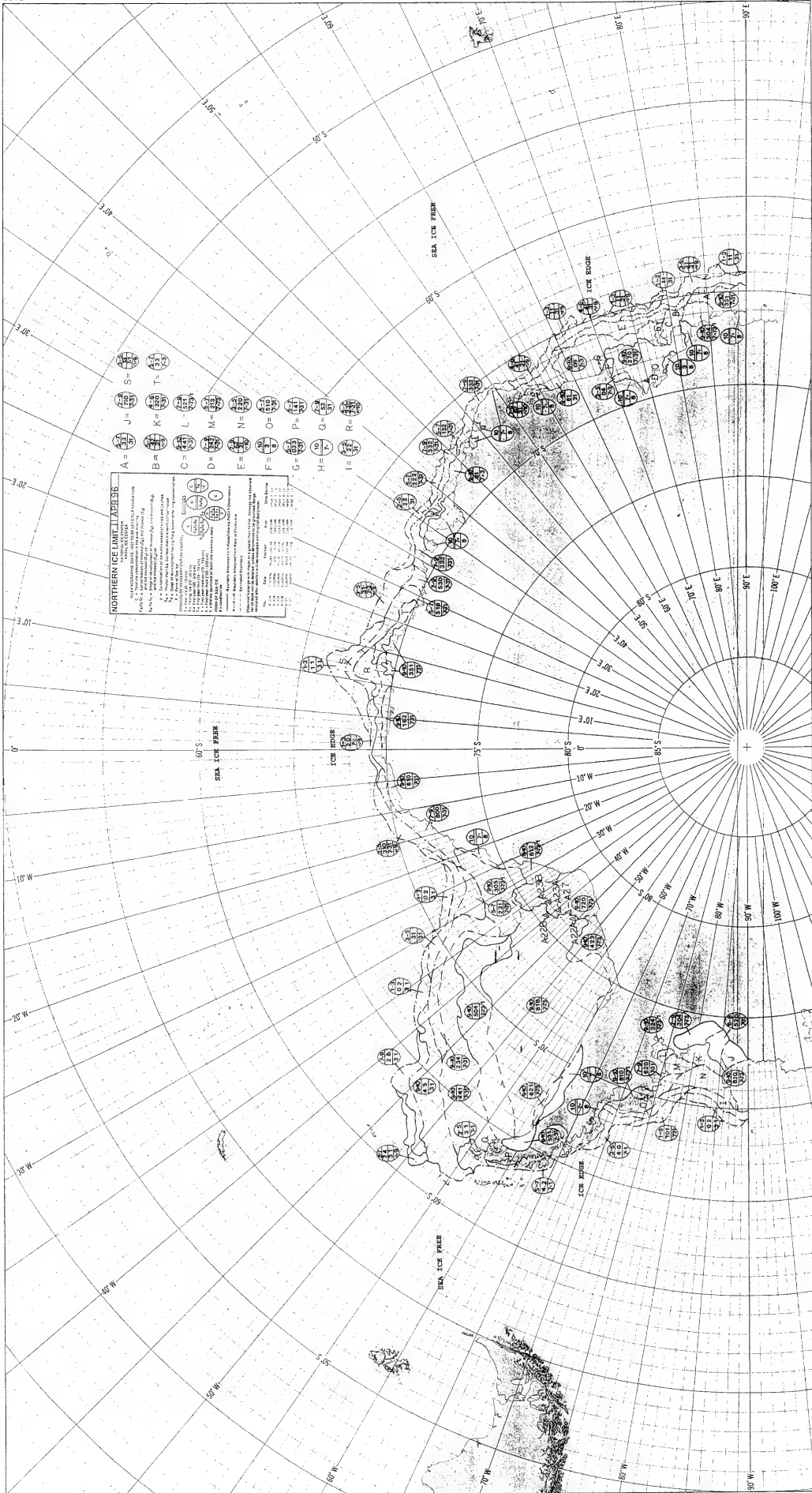


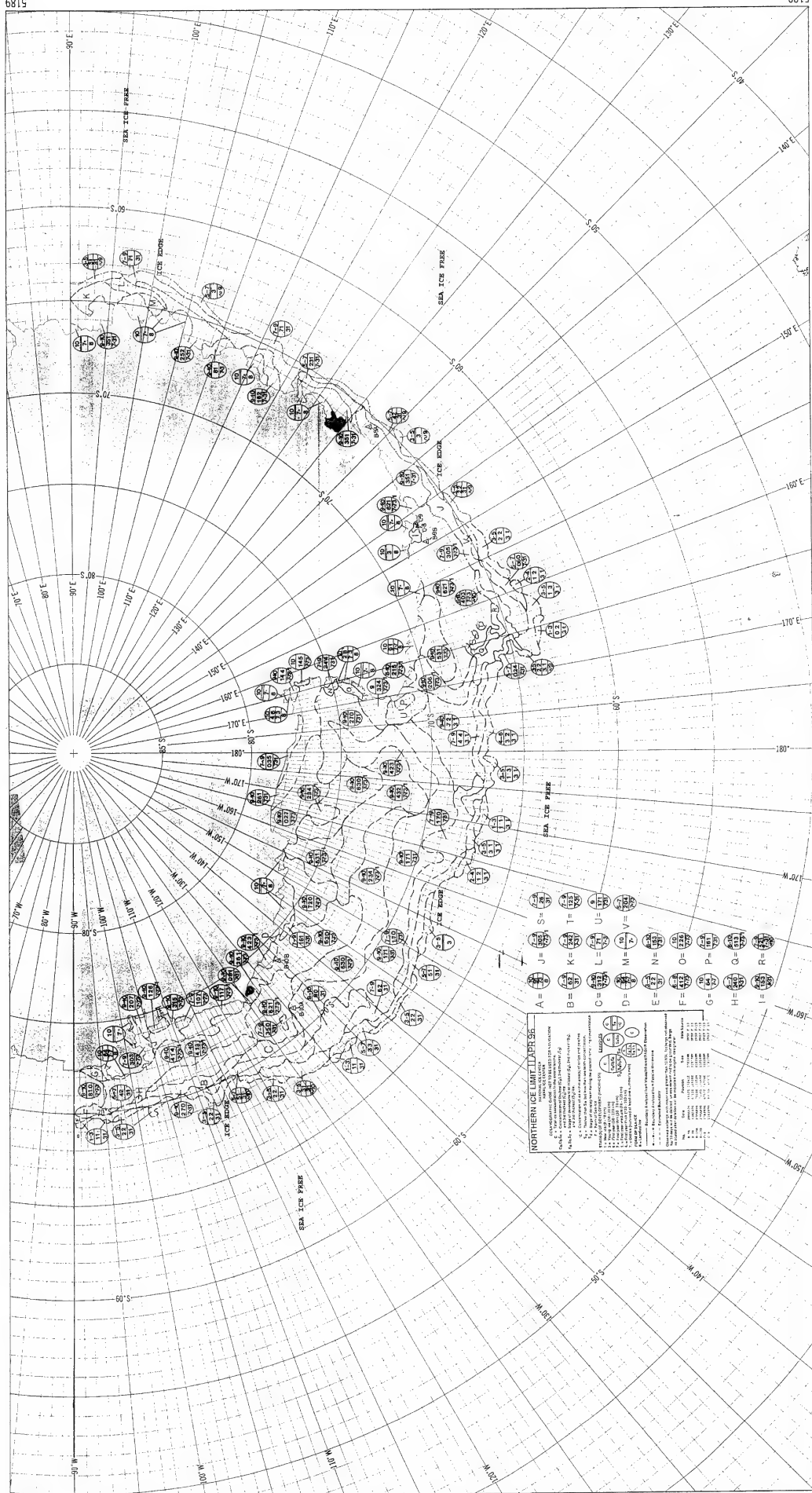


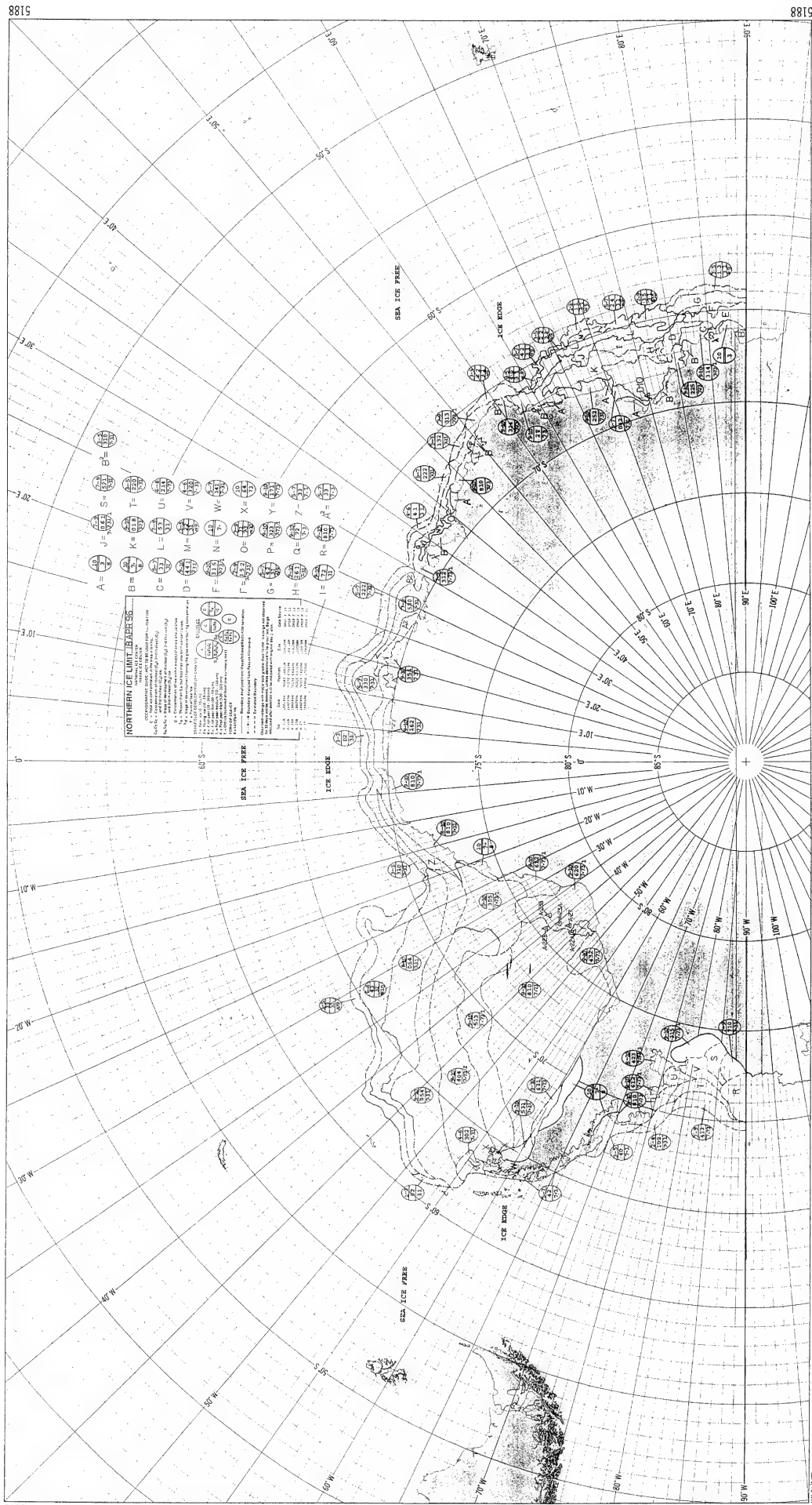








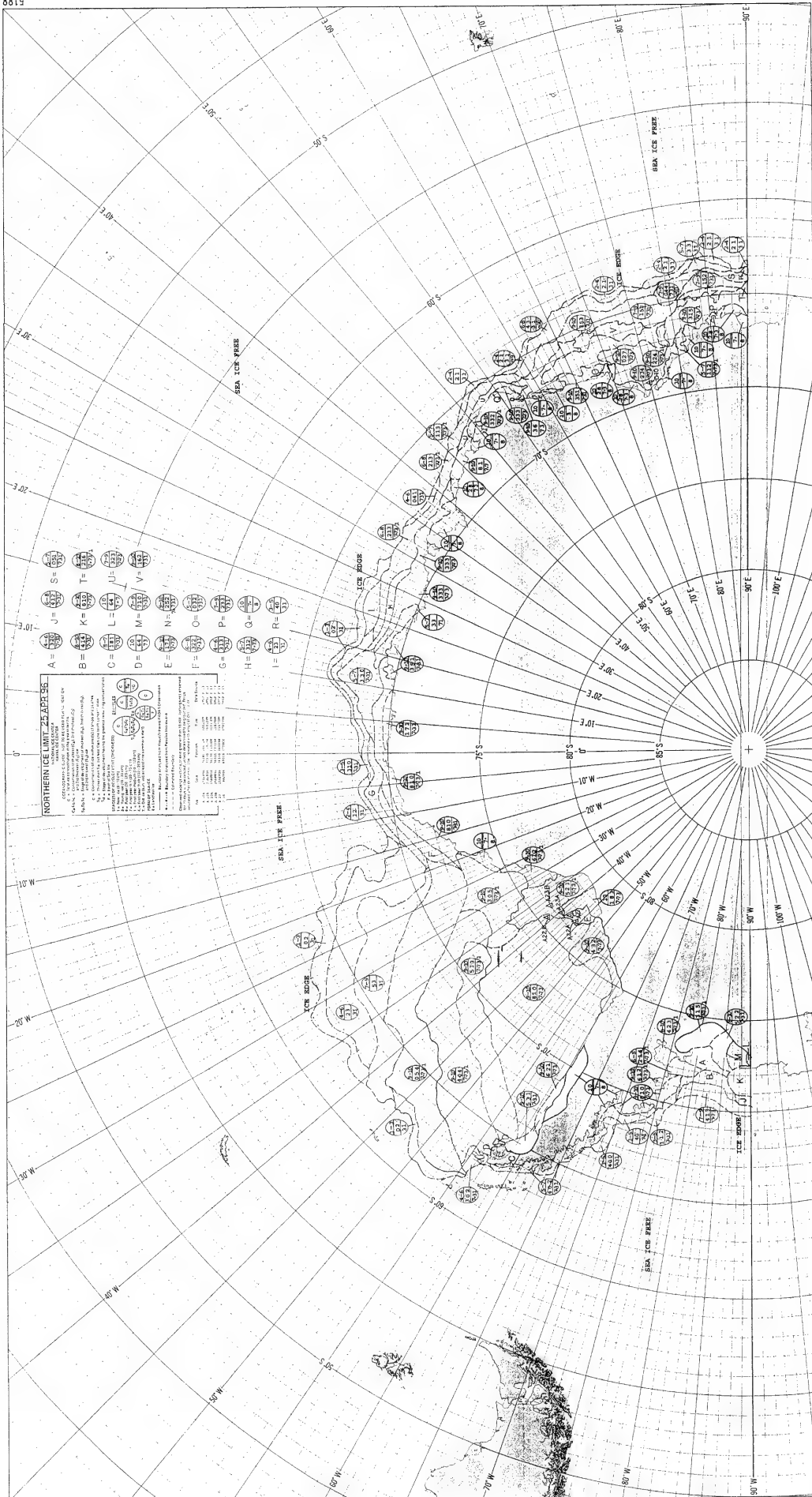


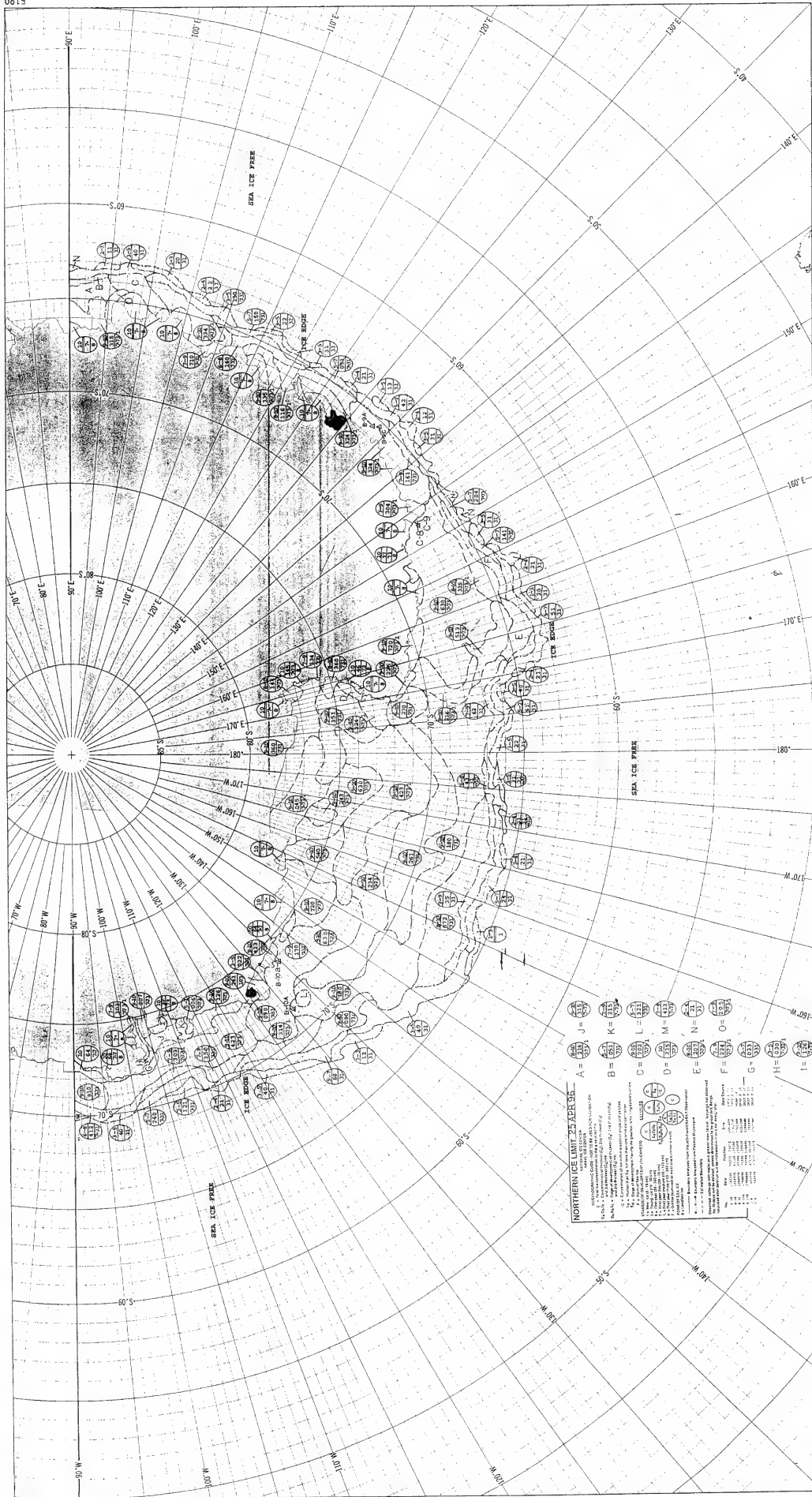


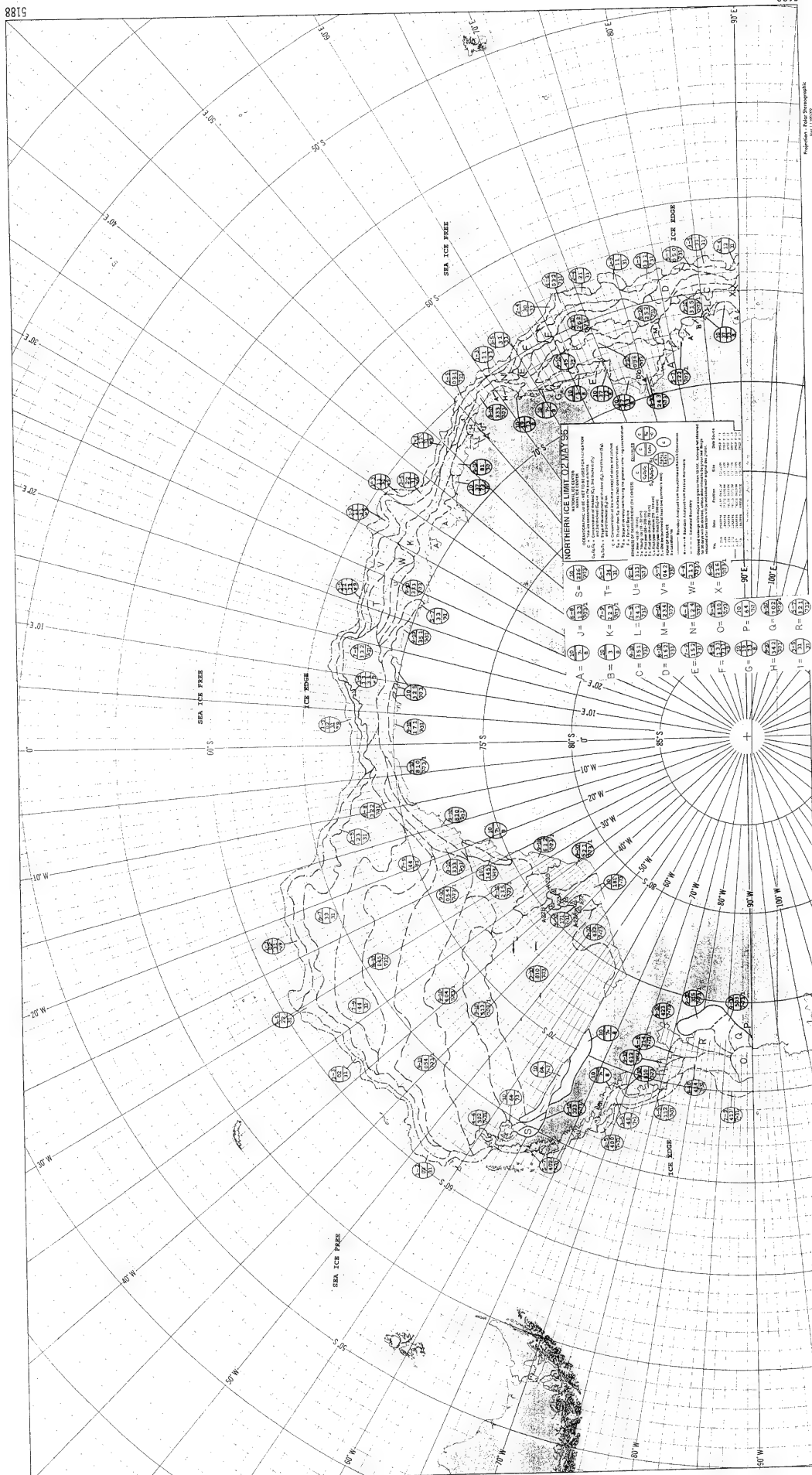
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Scale: 1:100,000

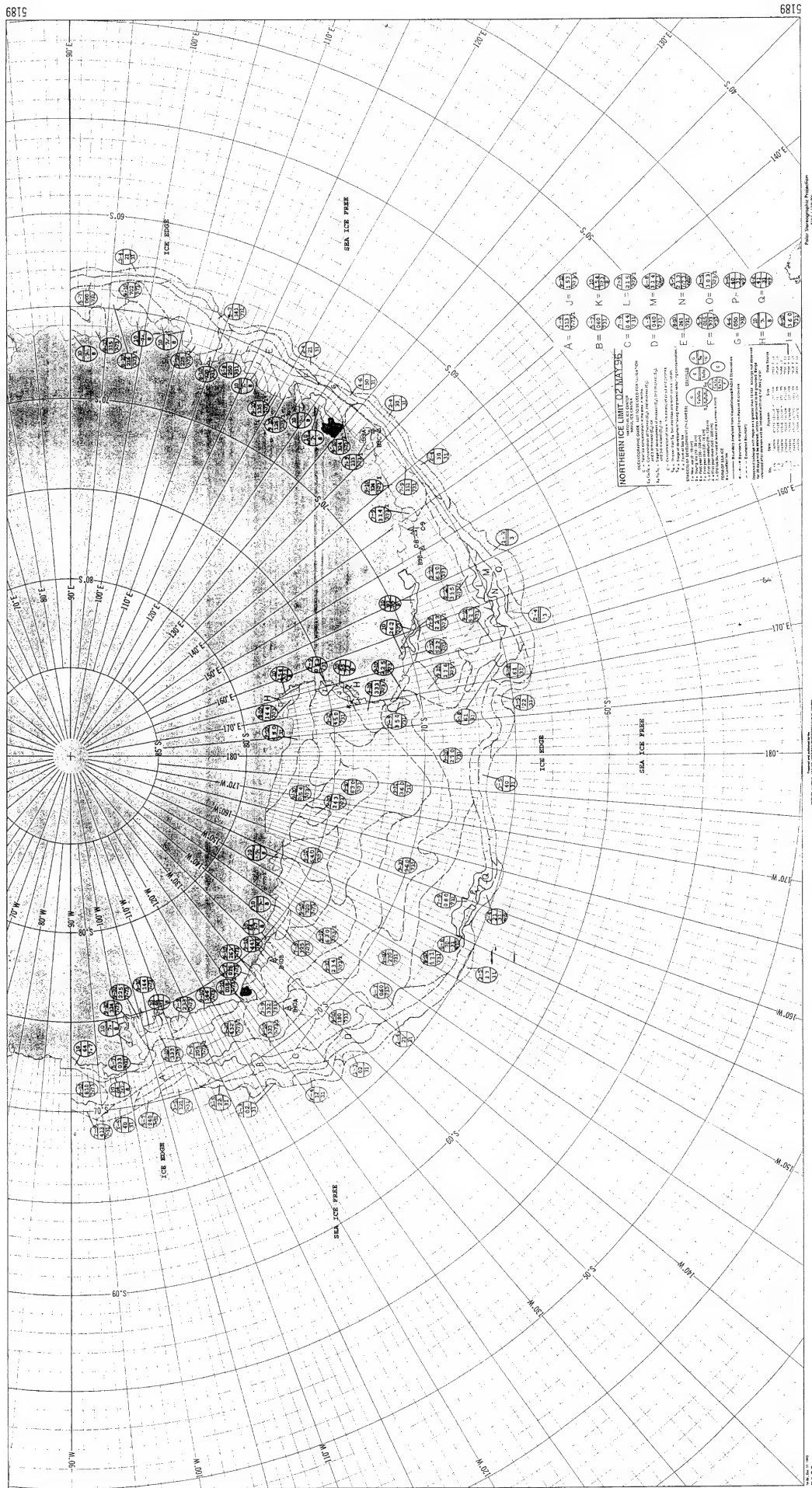
Source: Hydrographic Survey
Date: 1950

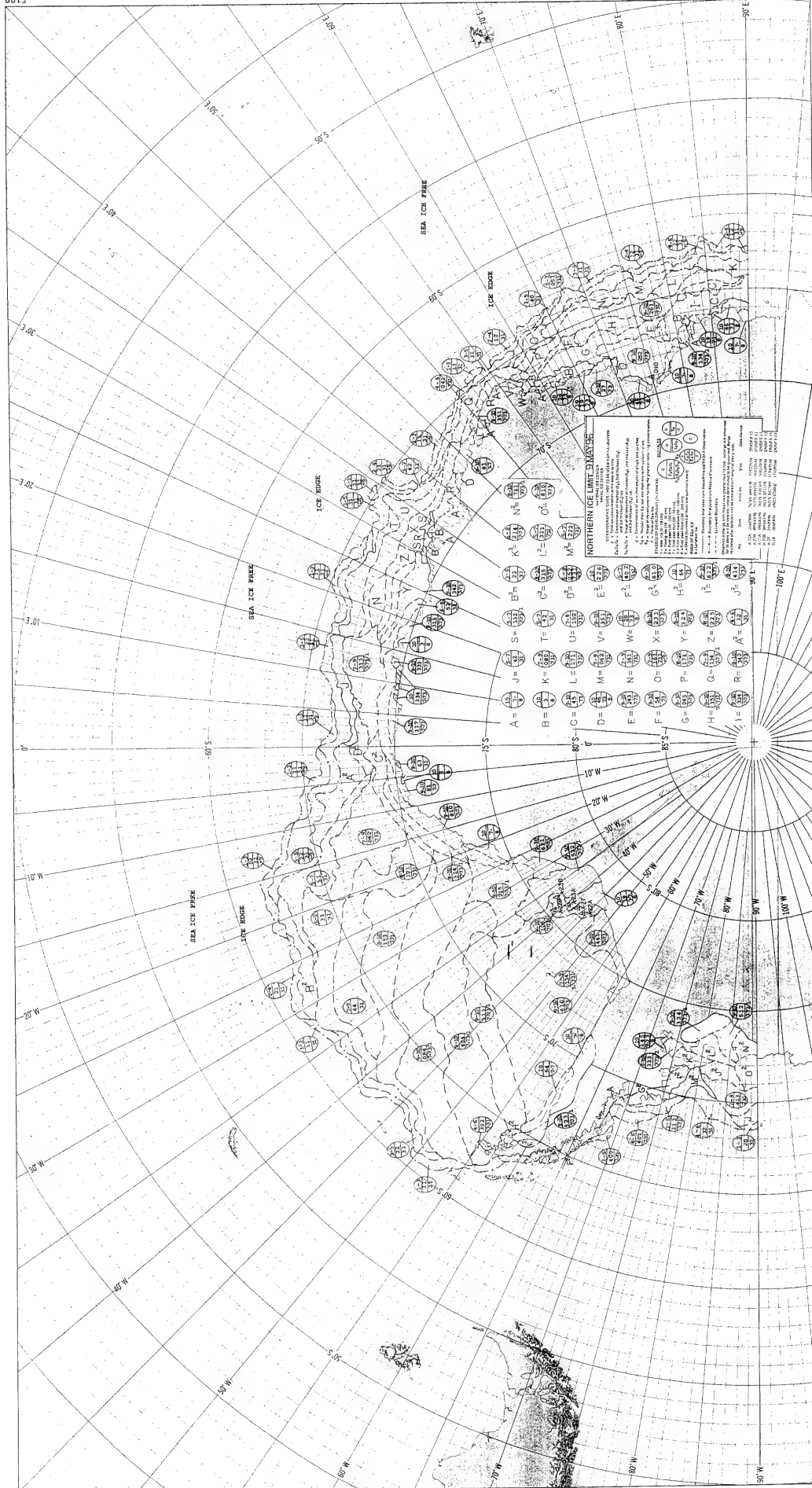






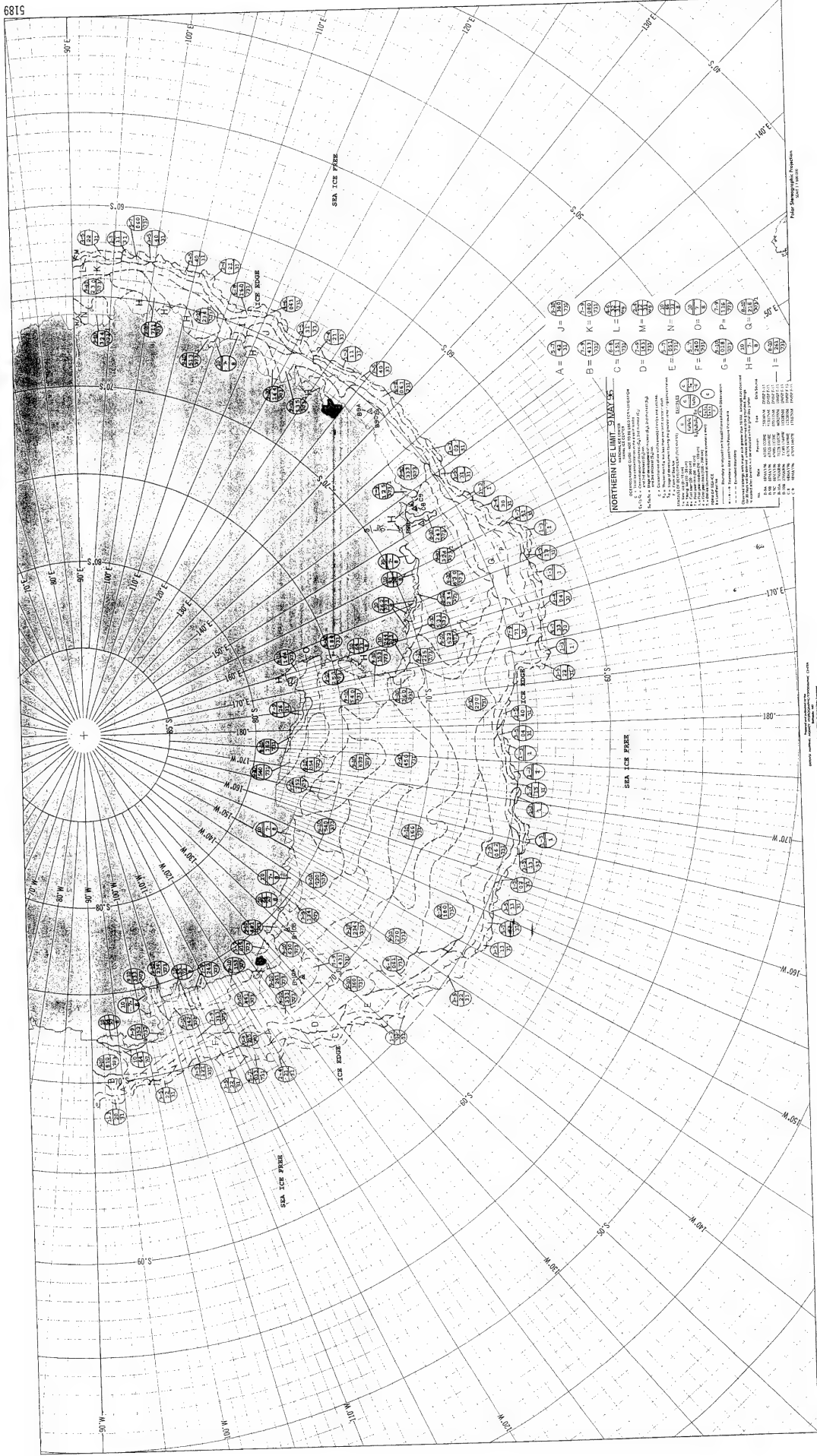


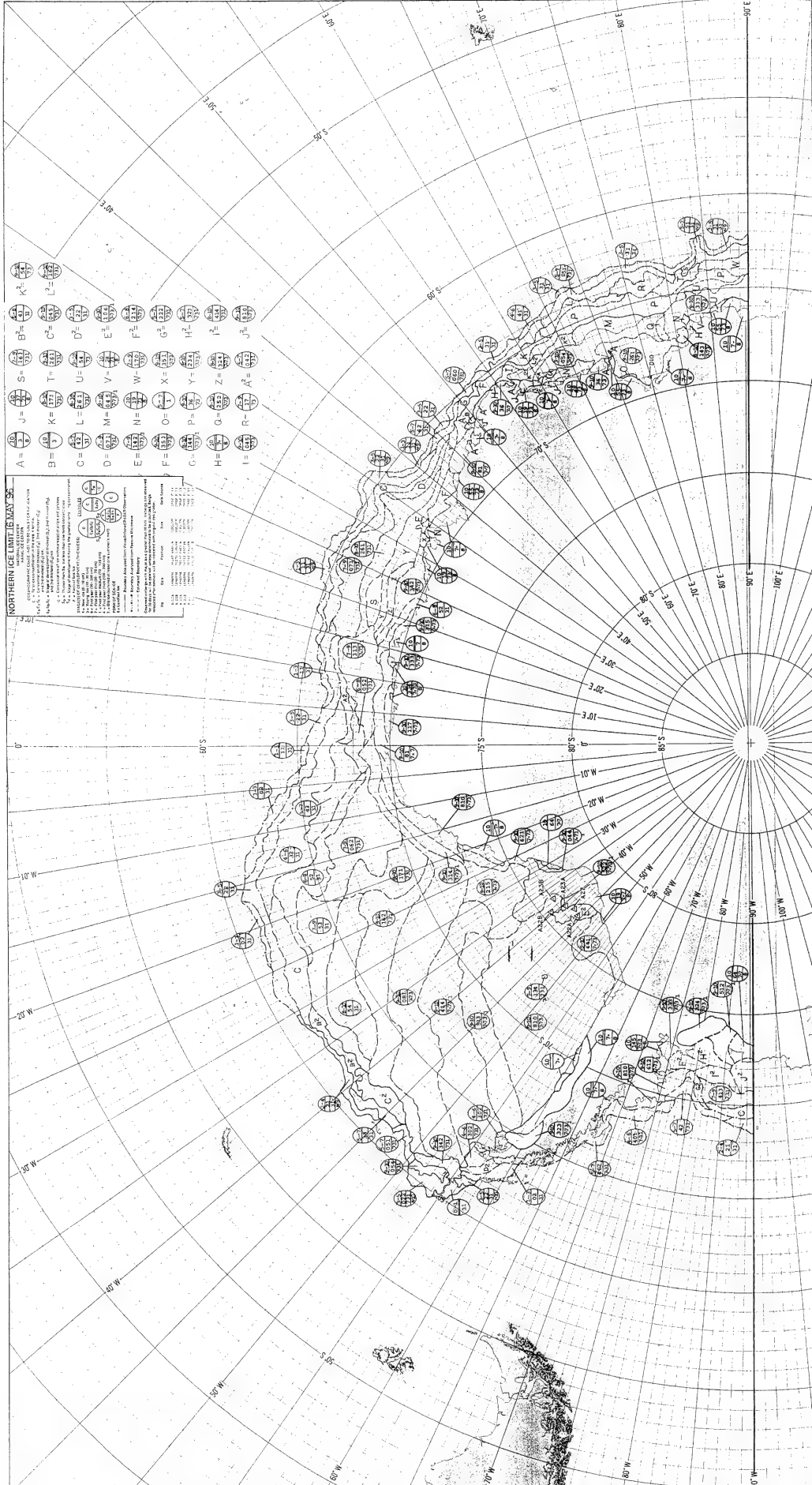


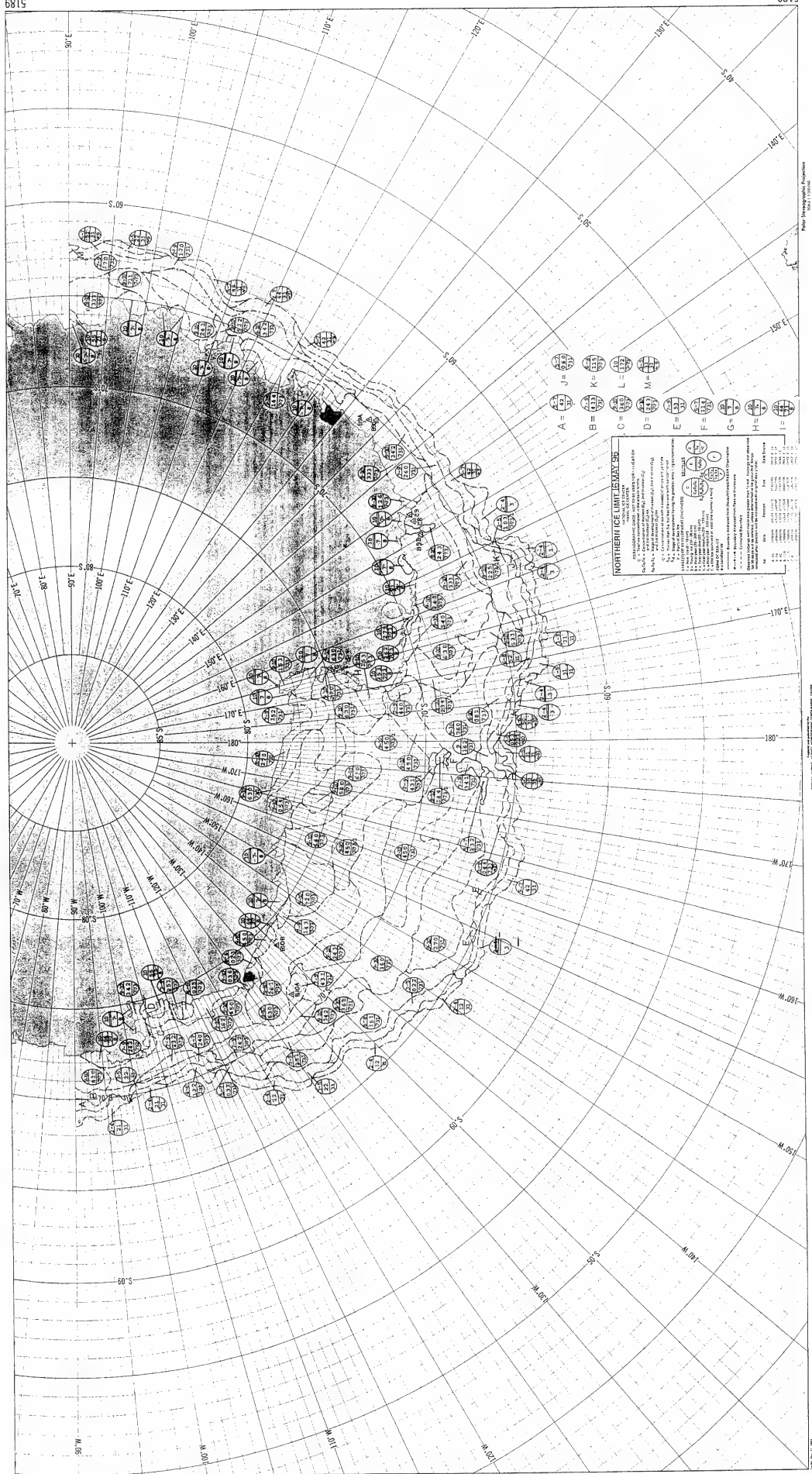


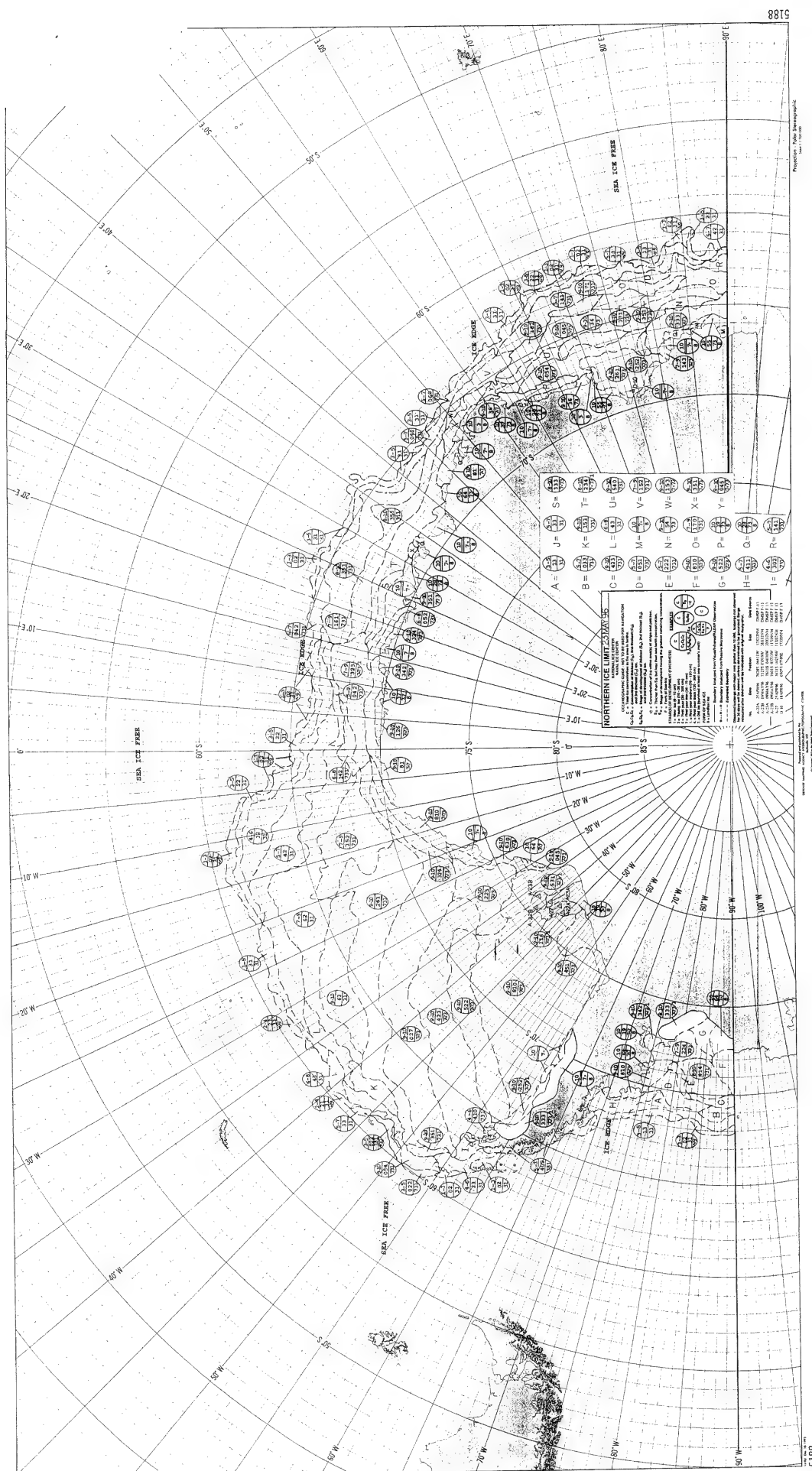
Prepared by: Fleet Surveying
Published: 1955

Scale: 1:100,000
Projection: Mercator









Projection: Polar Stereographic
Scale: 1:100,000

NORTHERN ICE LIMIT 22 MAY 55

ICE TYPES AND SYMBOLS:

- 1. OPEN WATER
- 2. BRASS
- 3. FIRST YEAR ICE
- 4. SECOND YEAR ICE
- 5. OLD ICE
- 6. ICE BOUND
- 7. SEA ICE PERM

ICE THICKNESS (Feet):

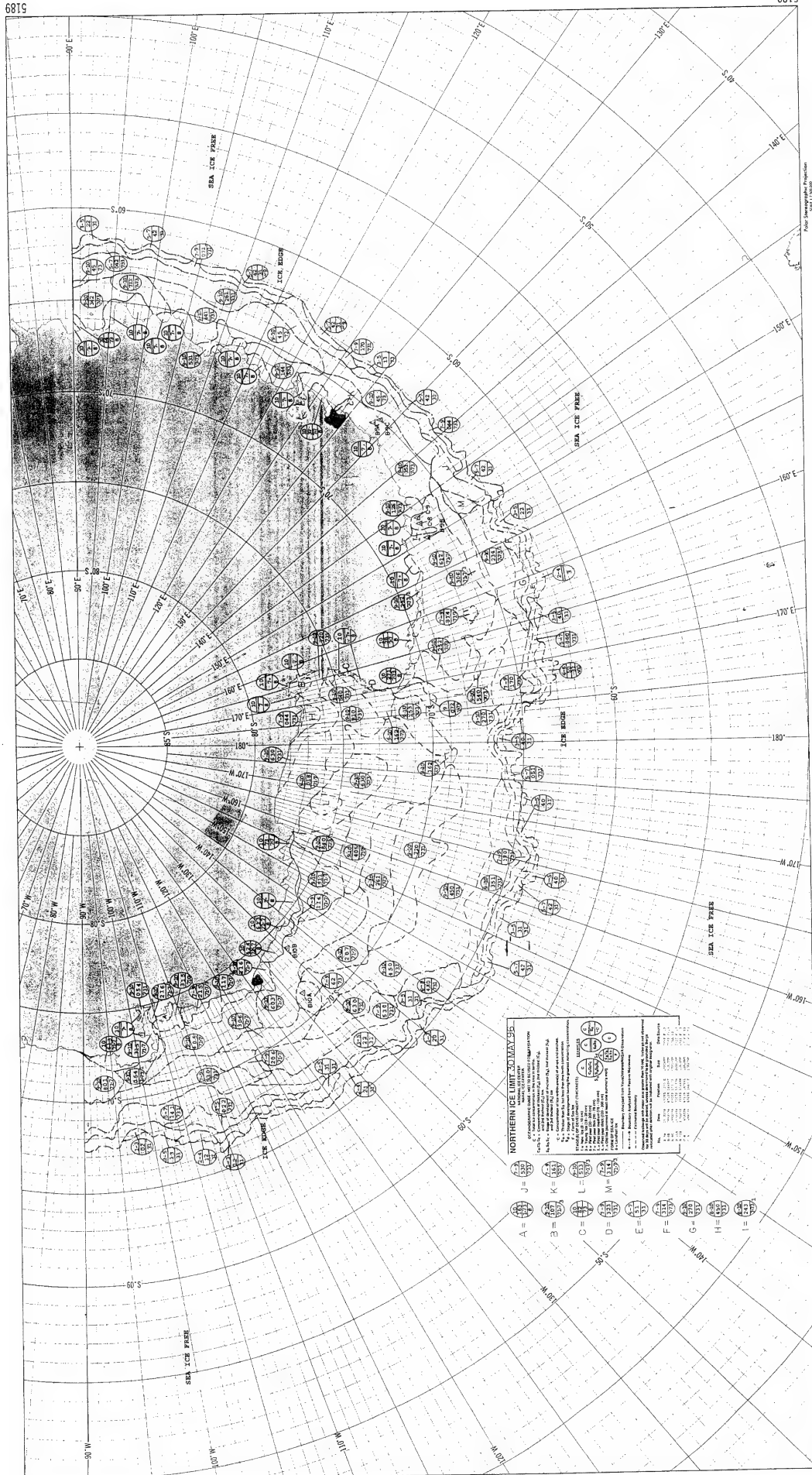
- 1. 0-1
- 2. 1-2
- 3. 2-3
- 4. 3-4
- 5. 4-5
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- 8. 7-8
- 9. 8-9
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- 100. 99-100

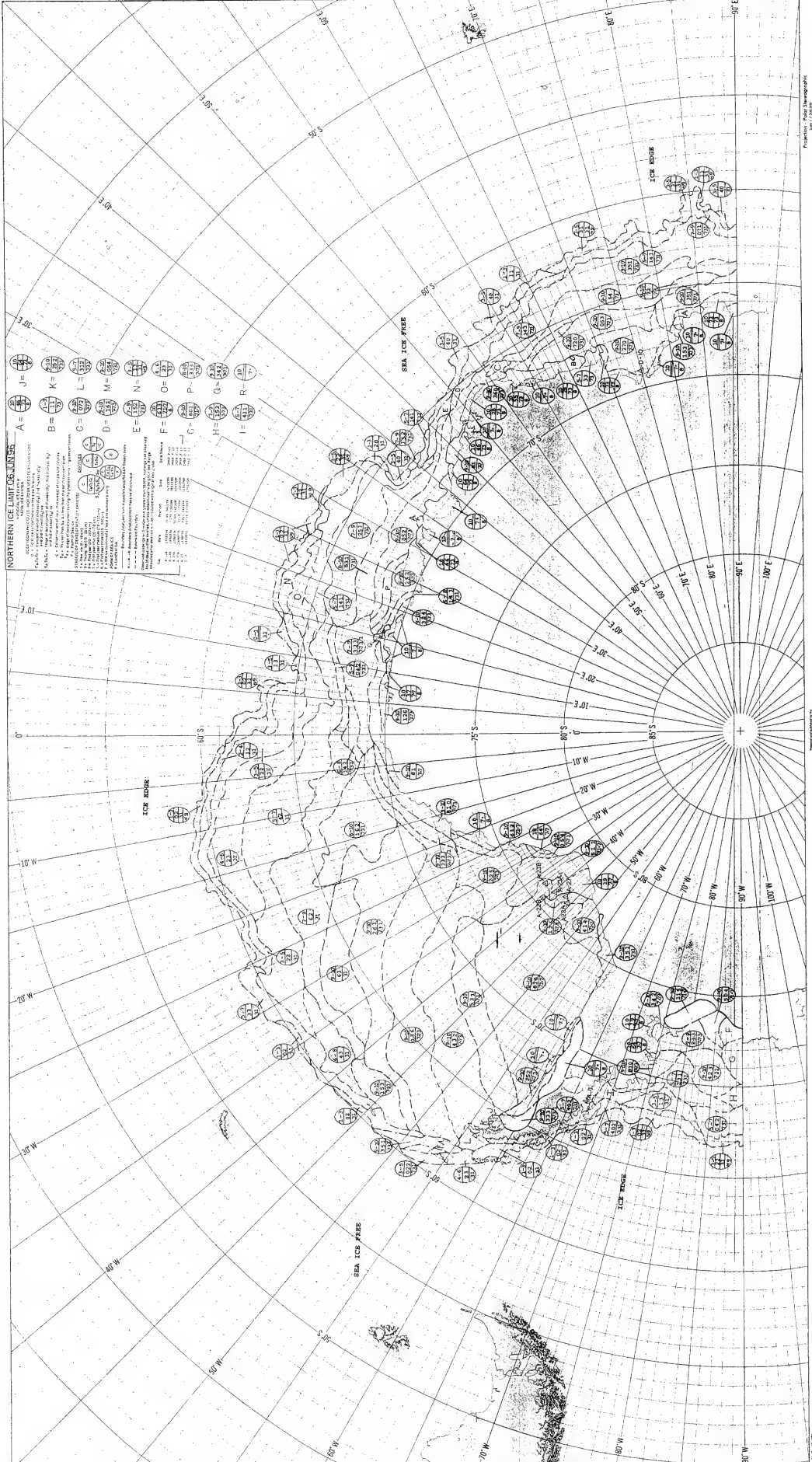
ICE DIRECTION (Degrees):

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- 2. 10-20
- 3. 20-30
- 4. 30-40
- 5. 40-50
- 6. 50-60
- 7. 60-70
- 8. 70-80
- 9. 80-90
- 10. 90-100
- 11. 100-110
- 12. 110-120
- 13. 120-130
- 14. 130-140
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- 75. 740-750
- 76. 750-760
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- 78. 770-780
- 79. 780-790
- 80. 790-800
- 81. 800-810
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- 83. 820-830
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- 100. 990-1000

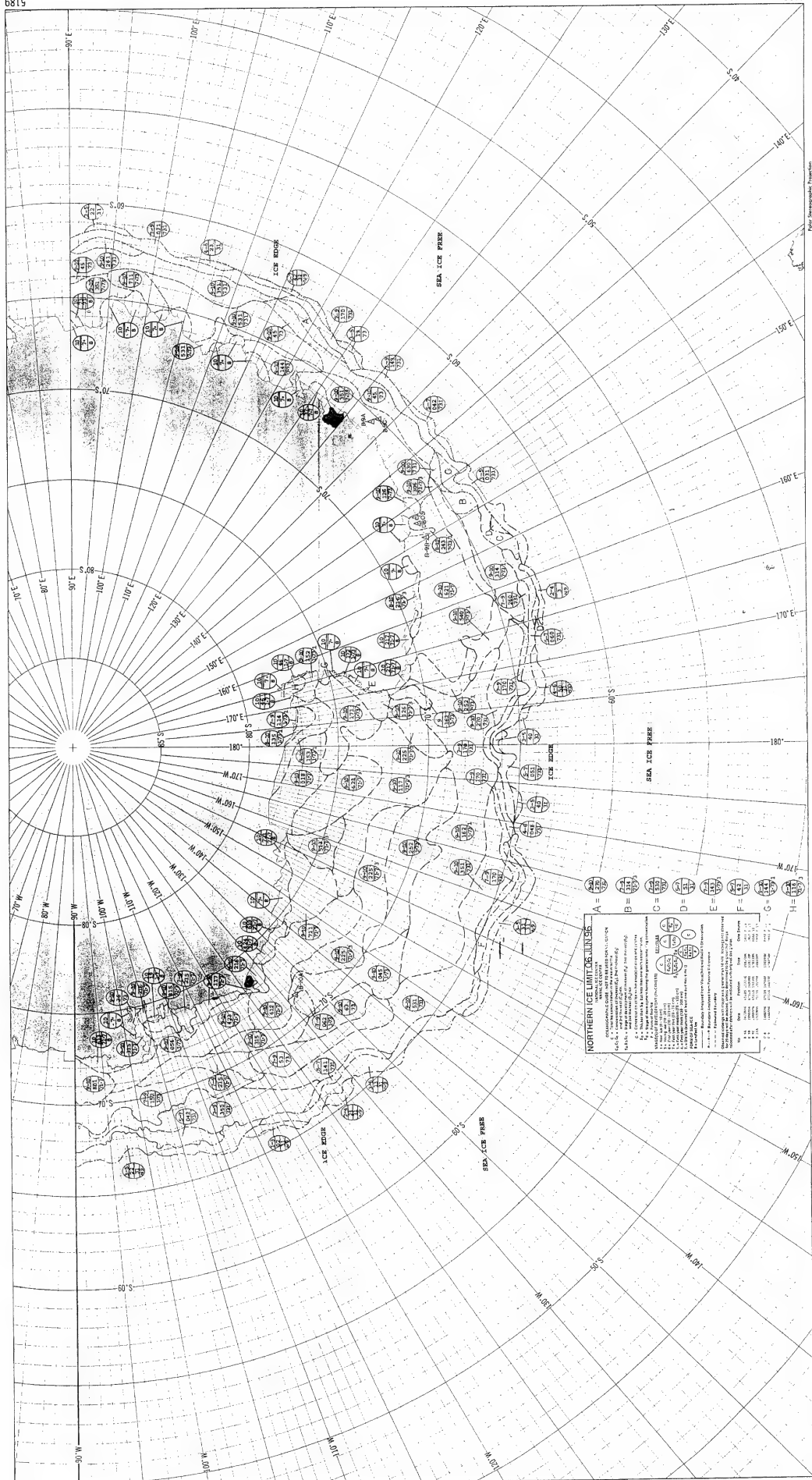


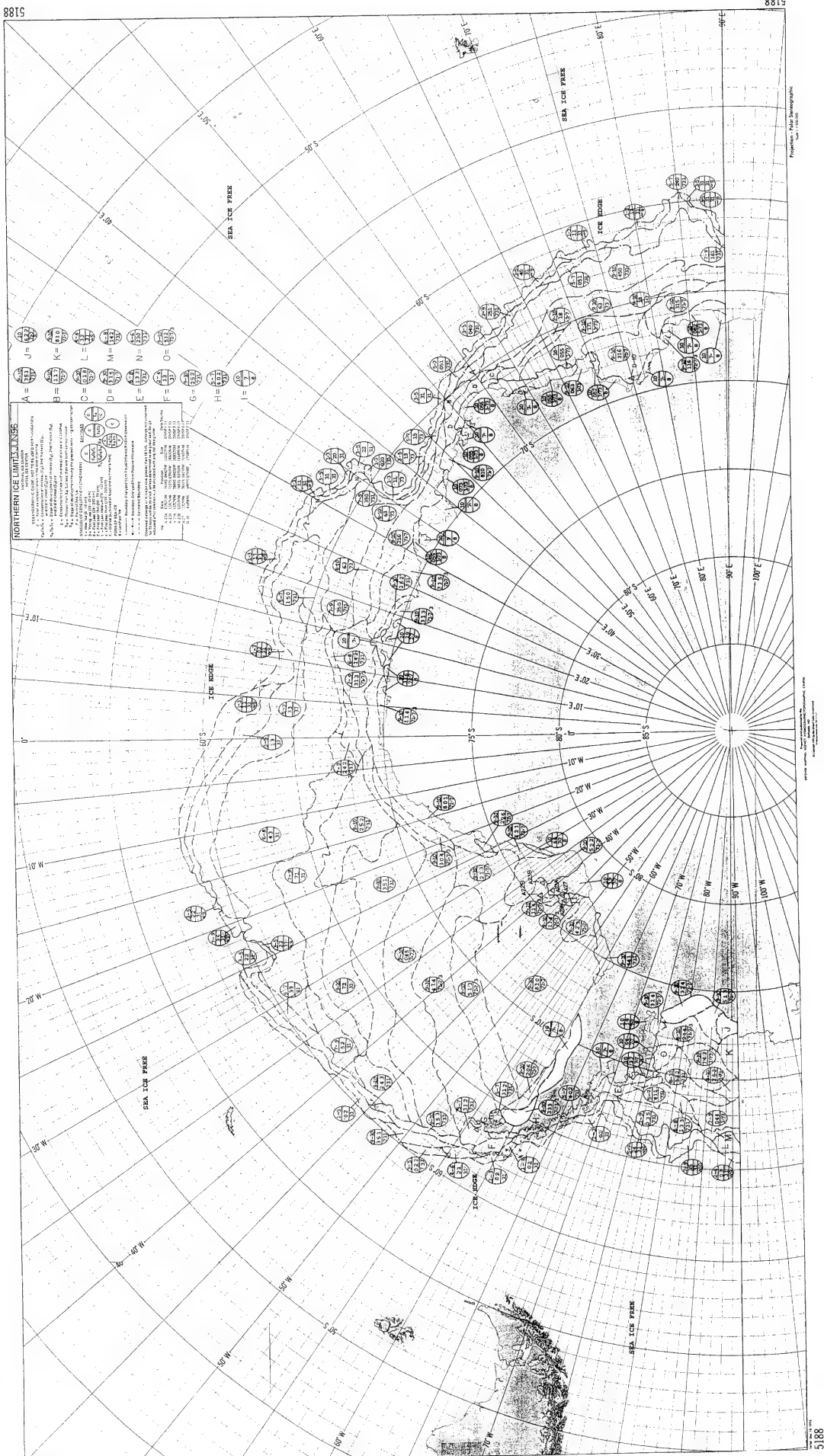






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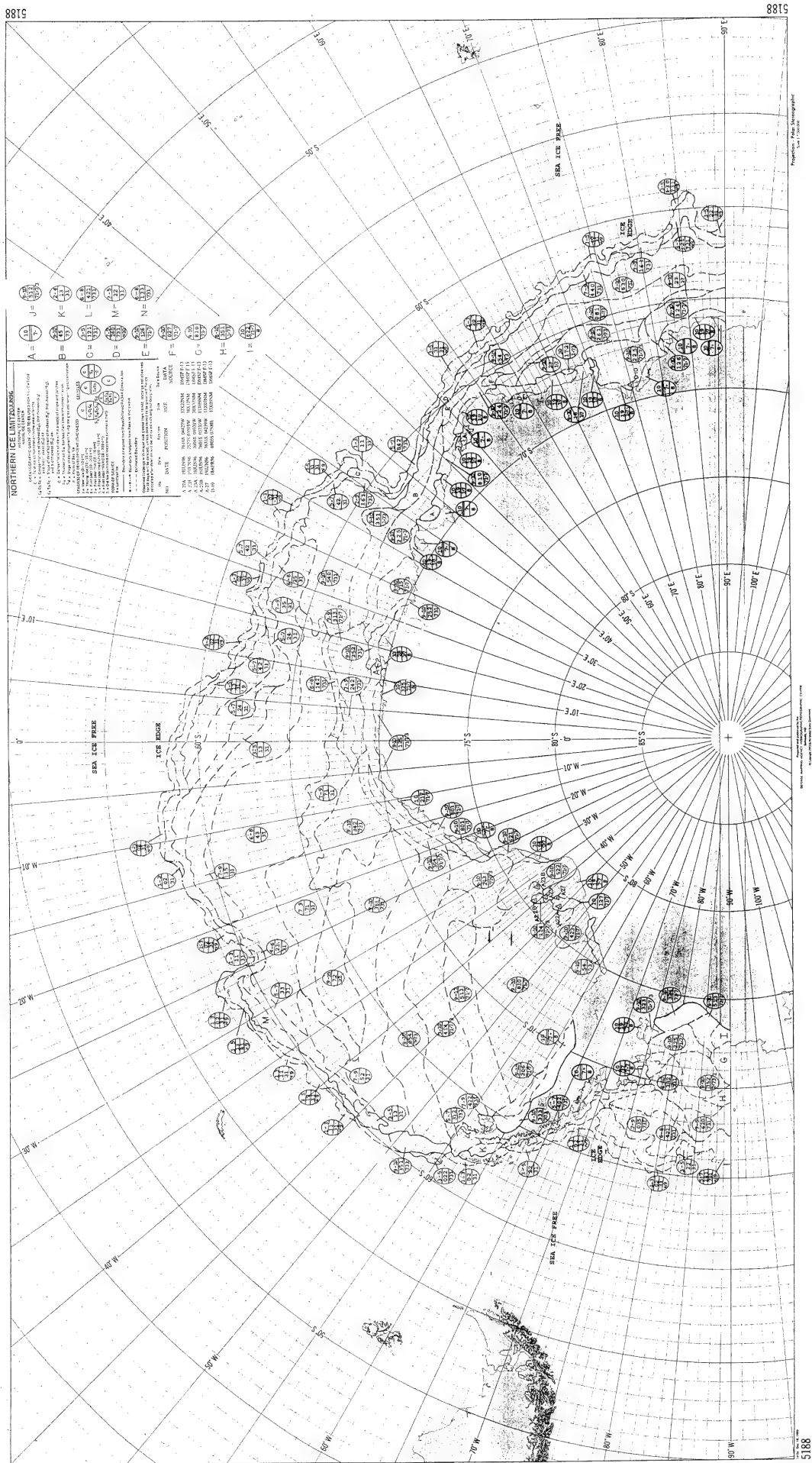




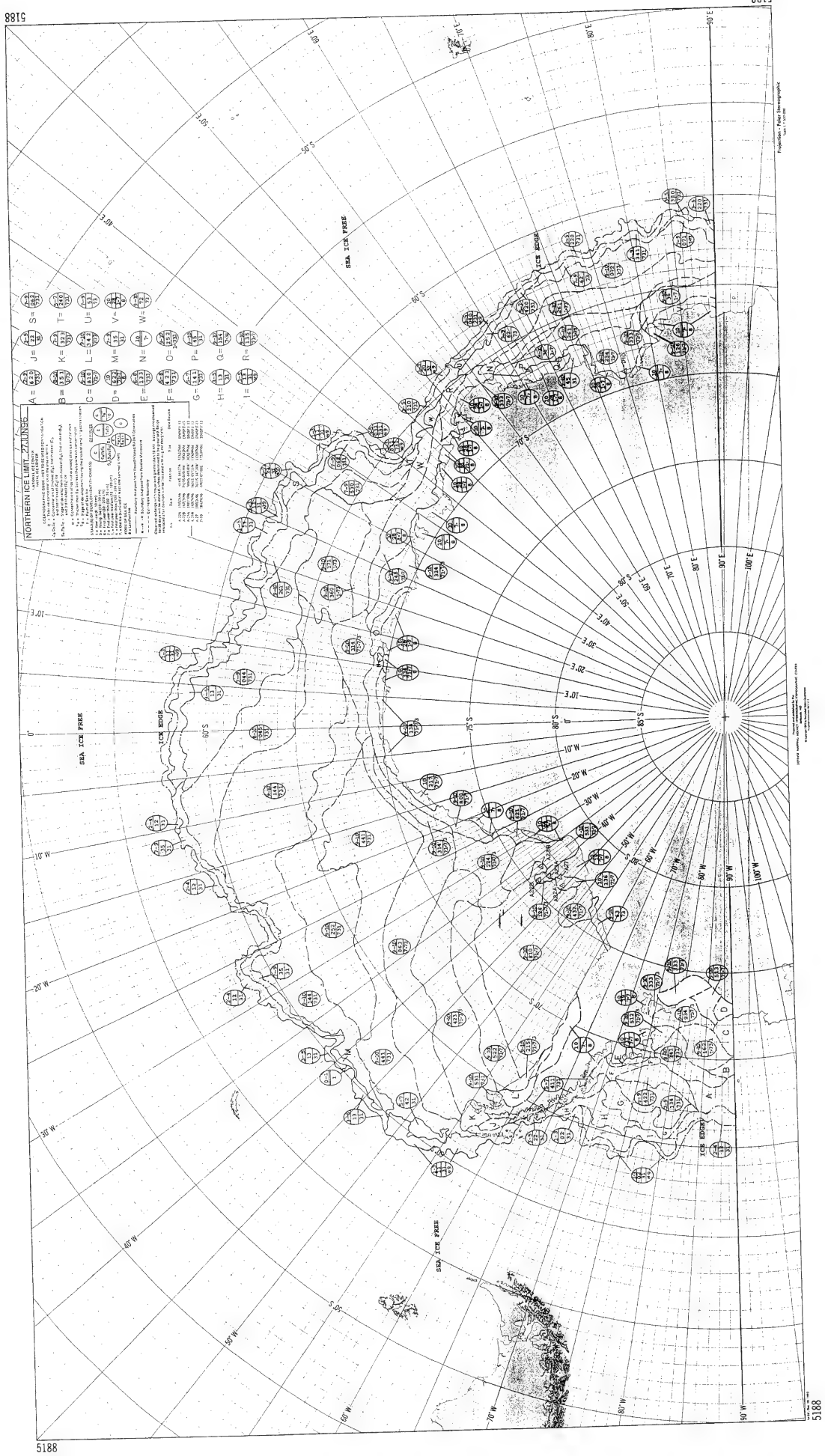
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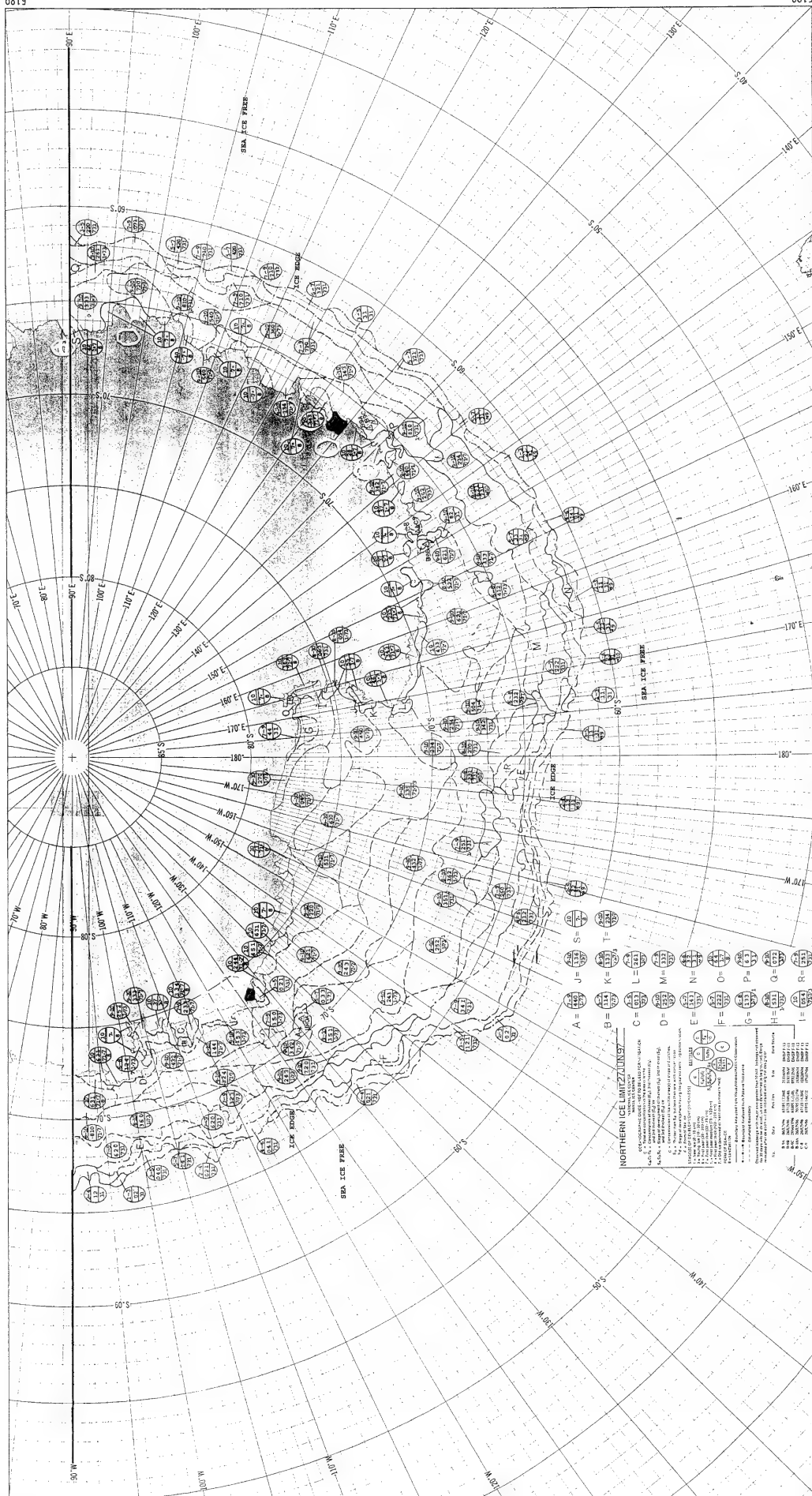
Source: U.S. Navy Hydrographic Office
Revised: 1960

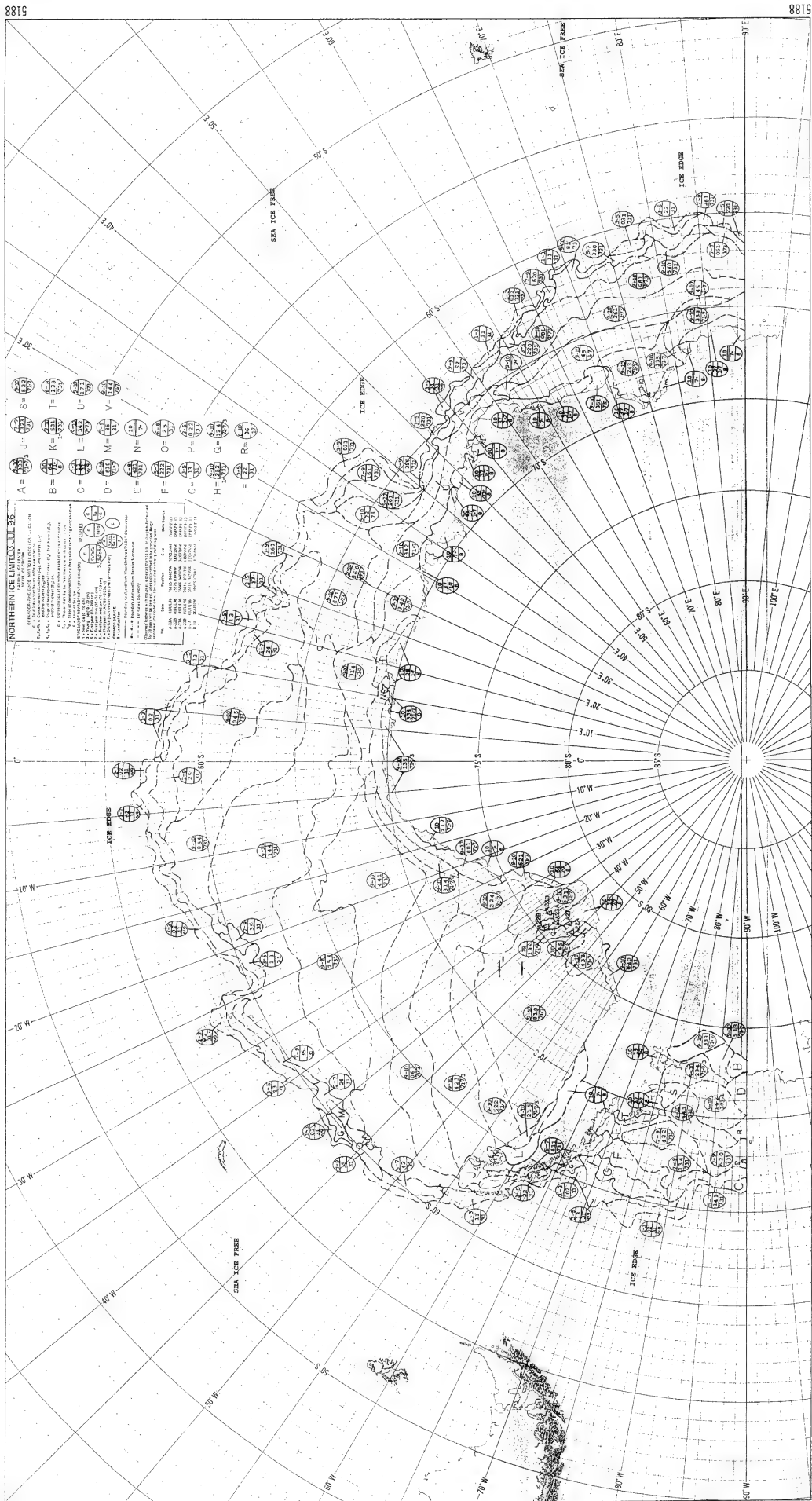


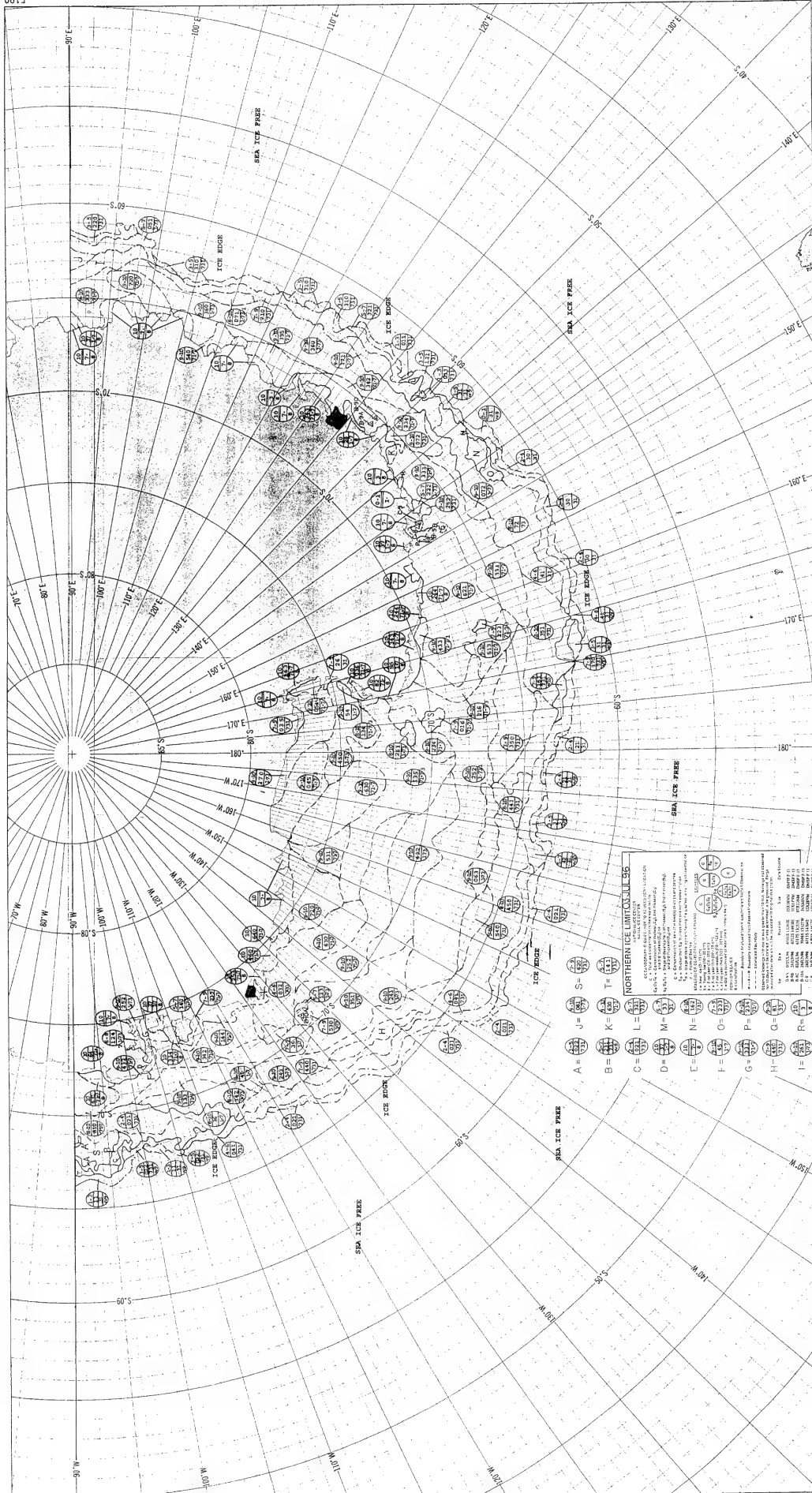










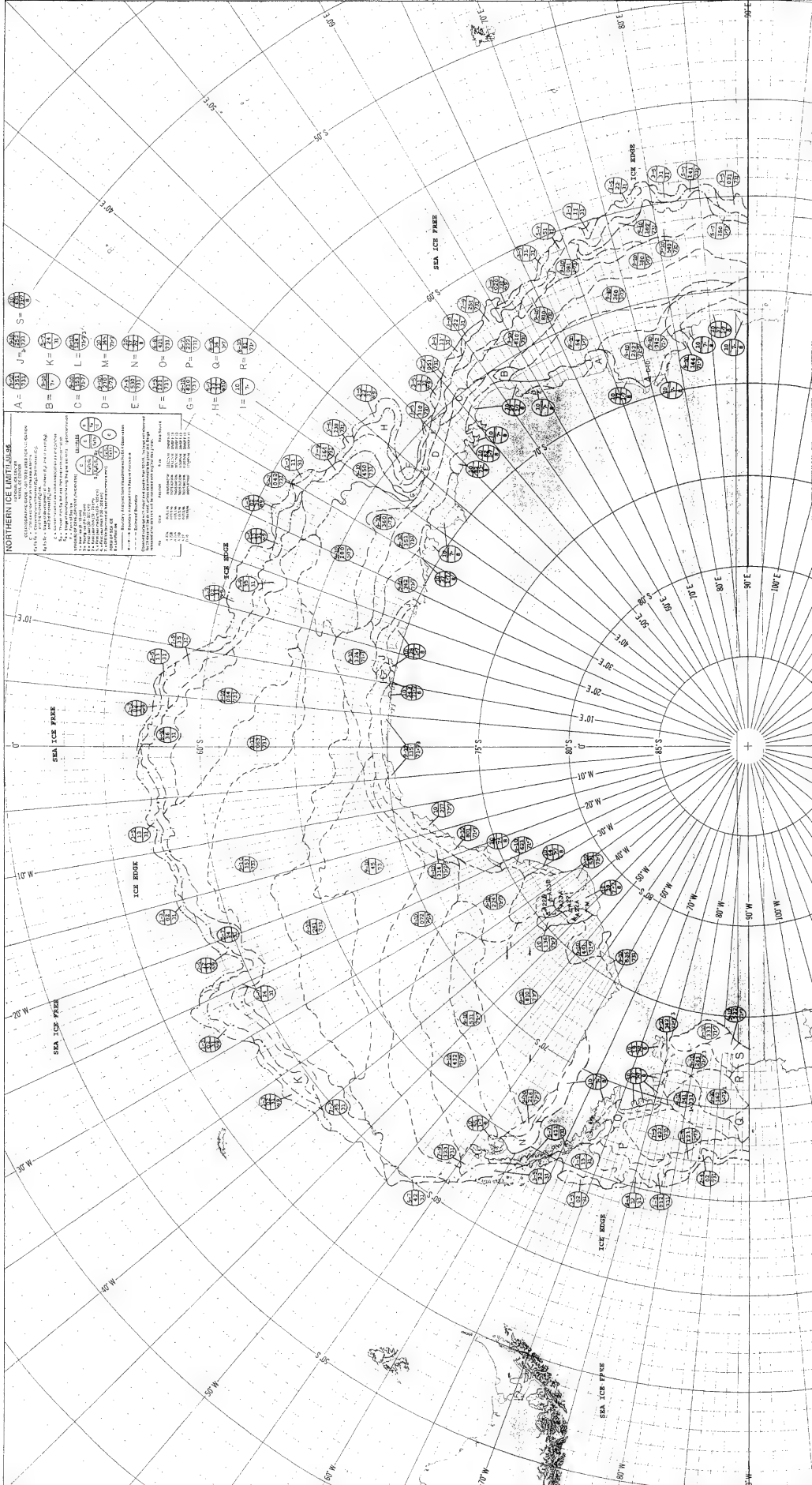


NORTHERN ICE LIMITS

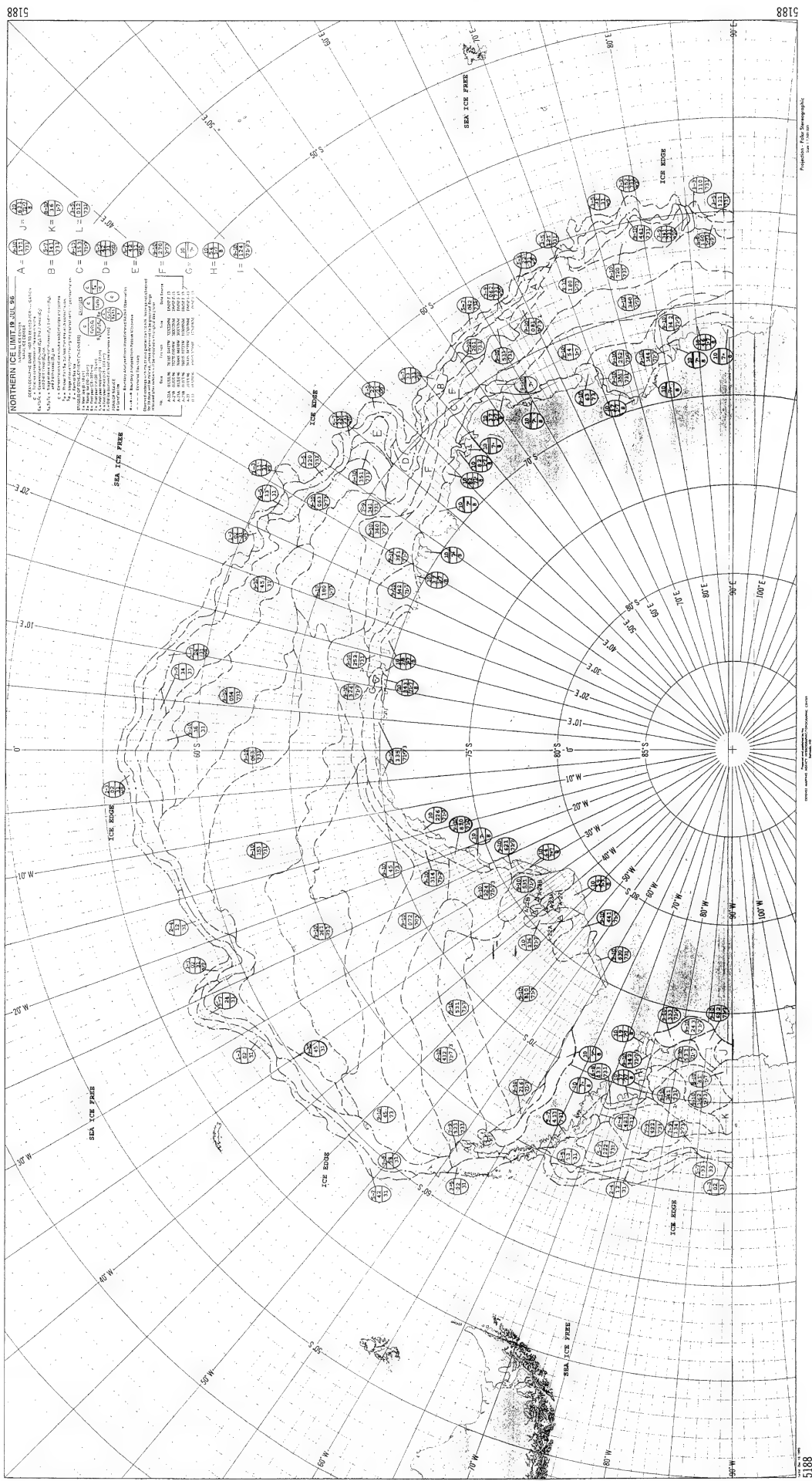
1. Ice Limit Symbols: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

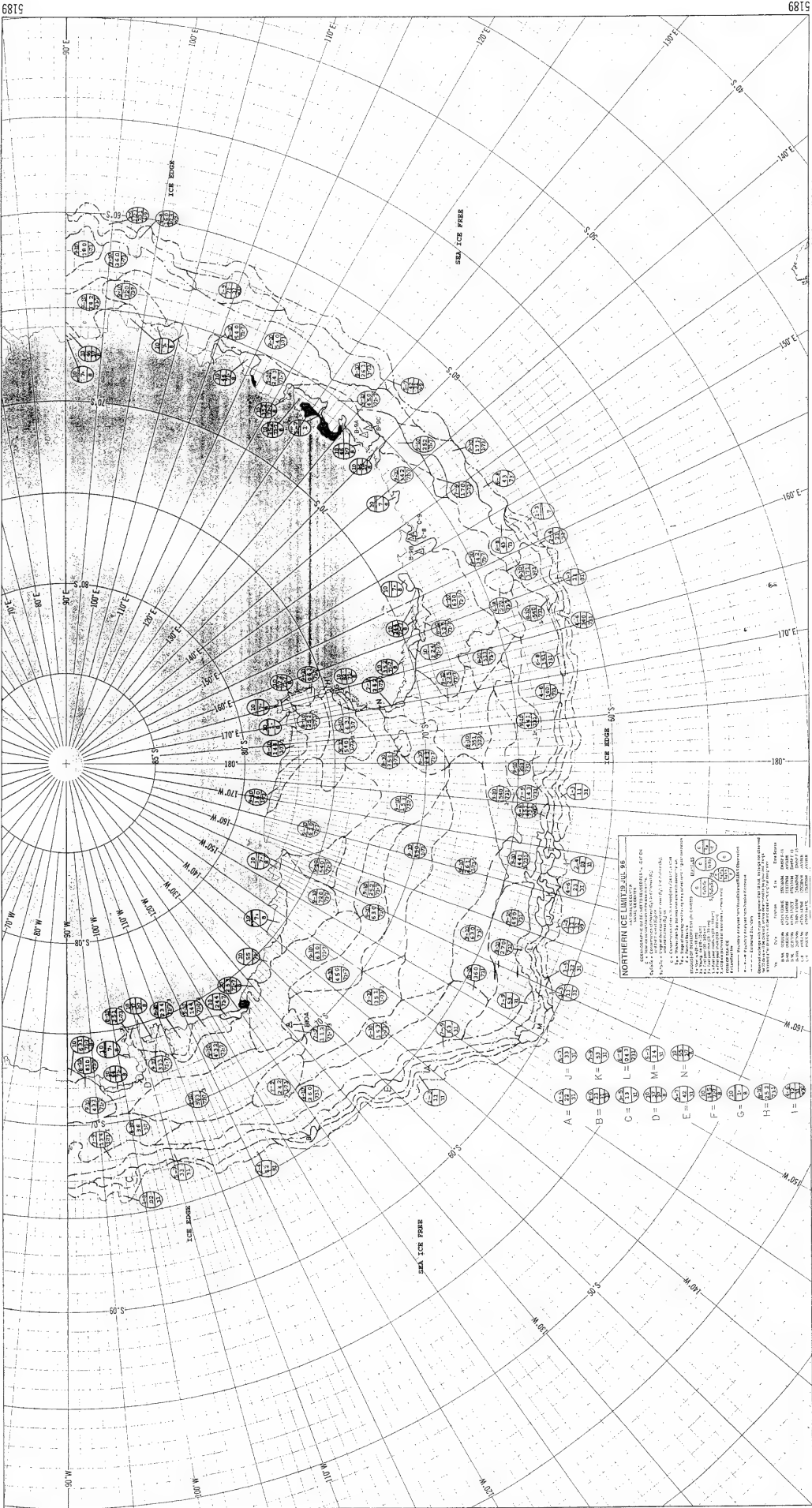
2. Ice Limit Descriptions: A - Ice Limit, B - Ice Limit, C - Ice Limit, D - Ice Limit, E - Ice Limit, F - Ice Limit, G - Ice Limit, H - Ice Limit, I - Ice Limit, J - Ice Limit, K - Ice Limit, L - Ice Limit, M - Ice Limit, N - Ice Limit, O - Ice Limit, P - Ice Limit, Q - Ice Limit, R - Ice Limit, S - Ice Limit, T - Ice Limit, U - Ice Limit, V - Ice Limit, W - Ice Limit, X - Ice Limit, Y - Ice Limit, Z - Ice Limit.

3. Ice Limit Notes: A - Ice Limit, B - Ice Limit, C - Ice Limit, D - Ice Limit, E - Ice Limit, F - Ice Limit, G - Ice Limit, H - Ice Limit, I - Ice Limit, J - Ice Limit, K - Ice Limit, L - Ice Limit, M - Ice Limit, N - Ice Limit, O - Ice Limit, P - Ice Limit, Q - Ice Limit, R - Ice Limit, S - Ice Limit, T - Ice Limit, U - Ice Limit, V - Ice Limit, W - Ice Limit, X - Ice Limit, Y - Ice Limit, Z - Ice Limit.

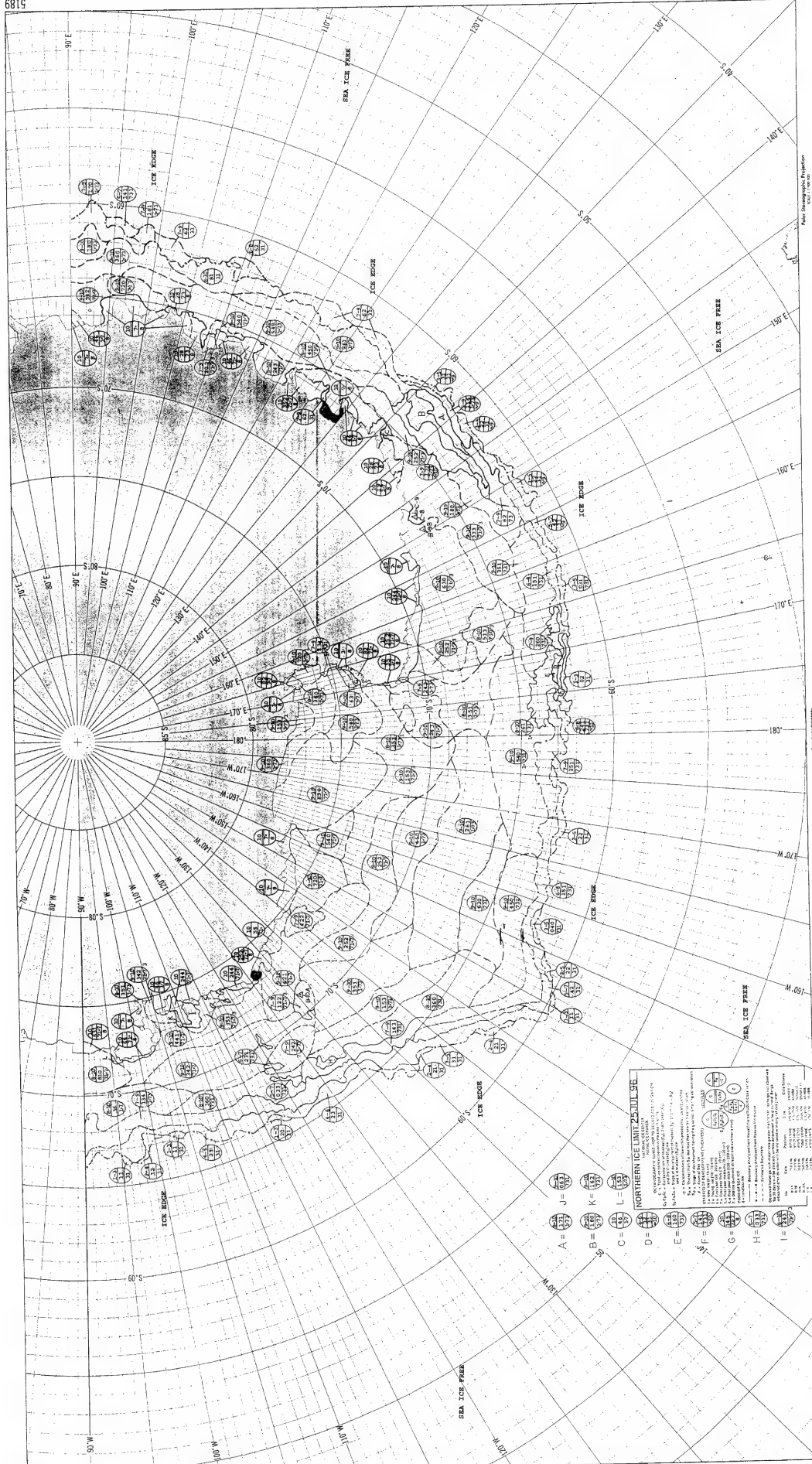


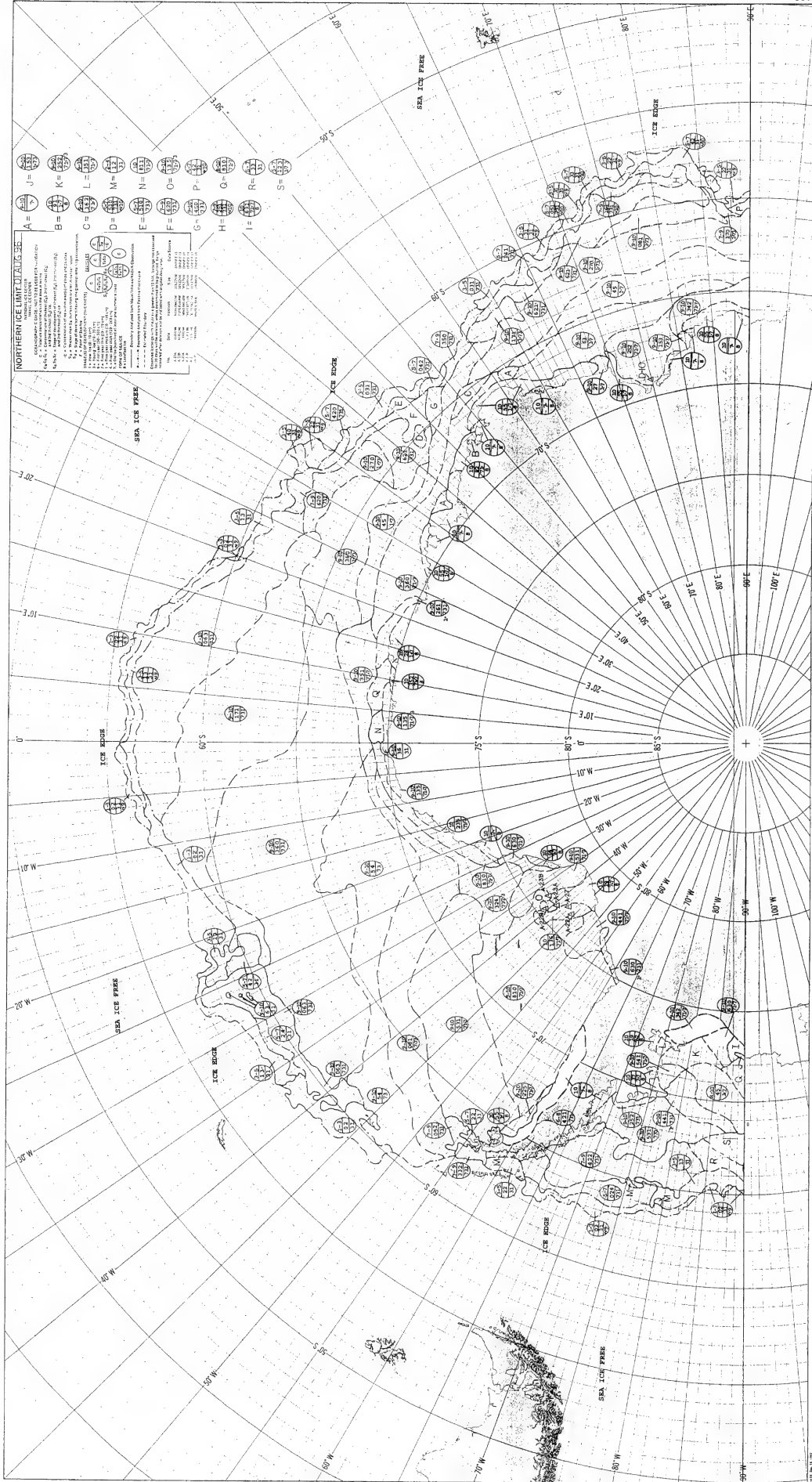




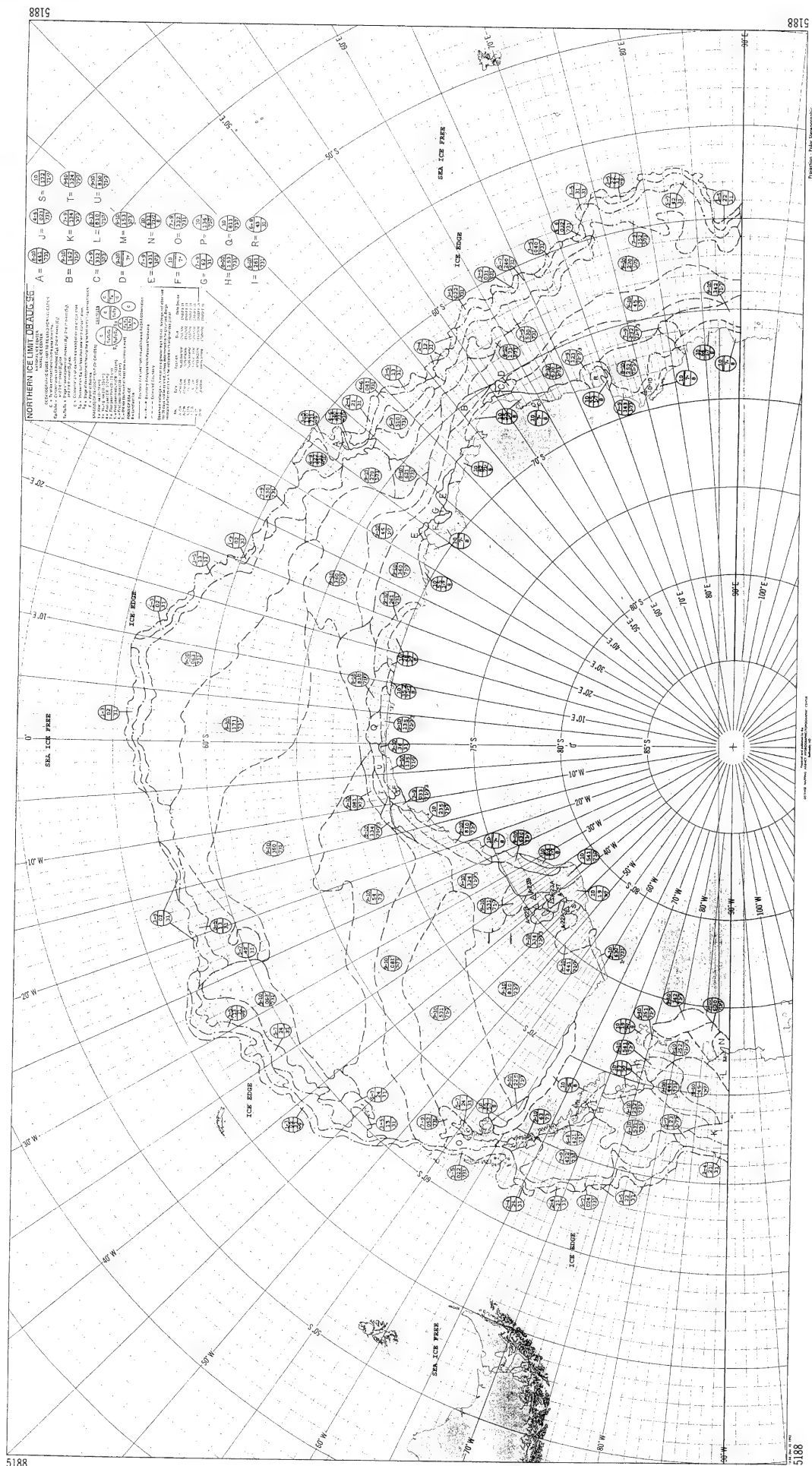


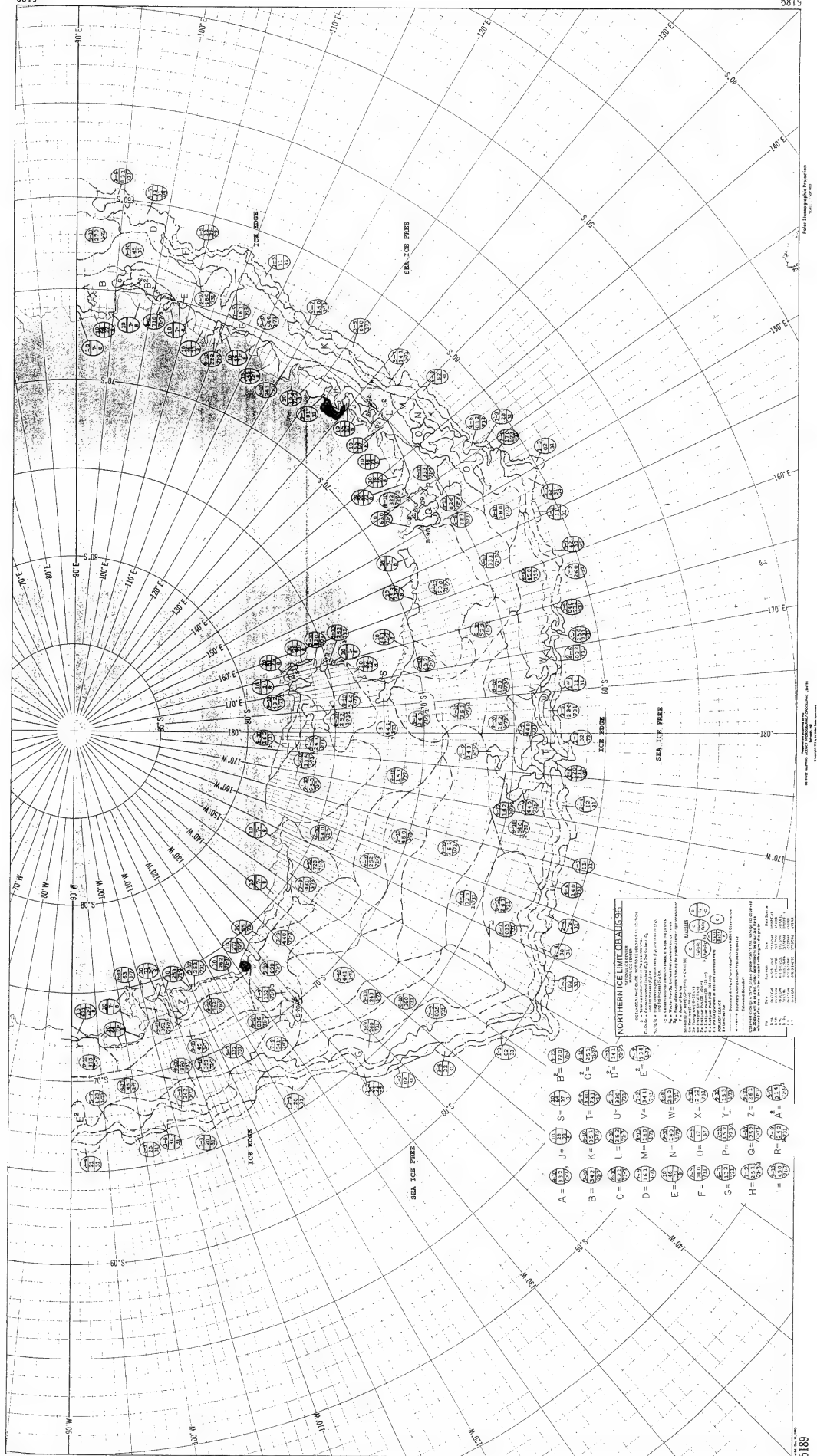


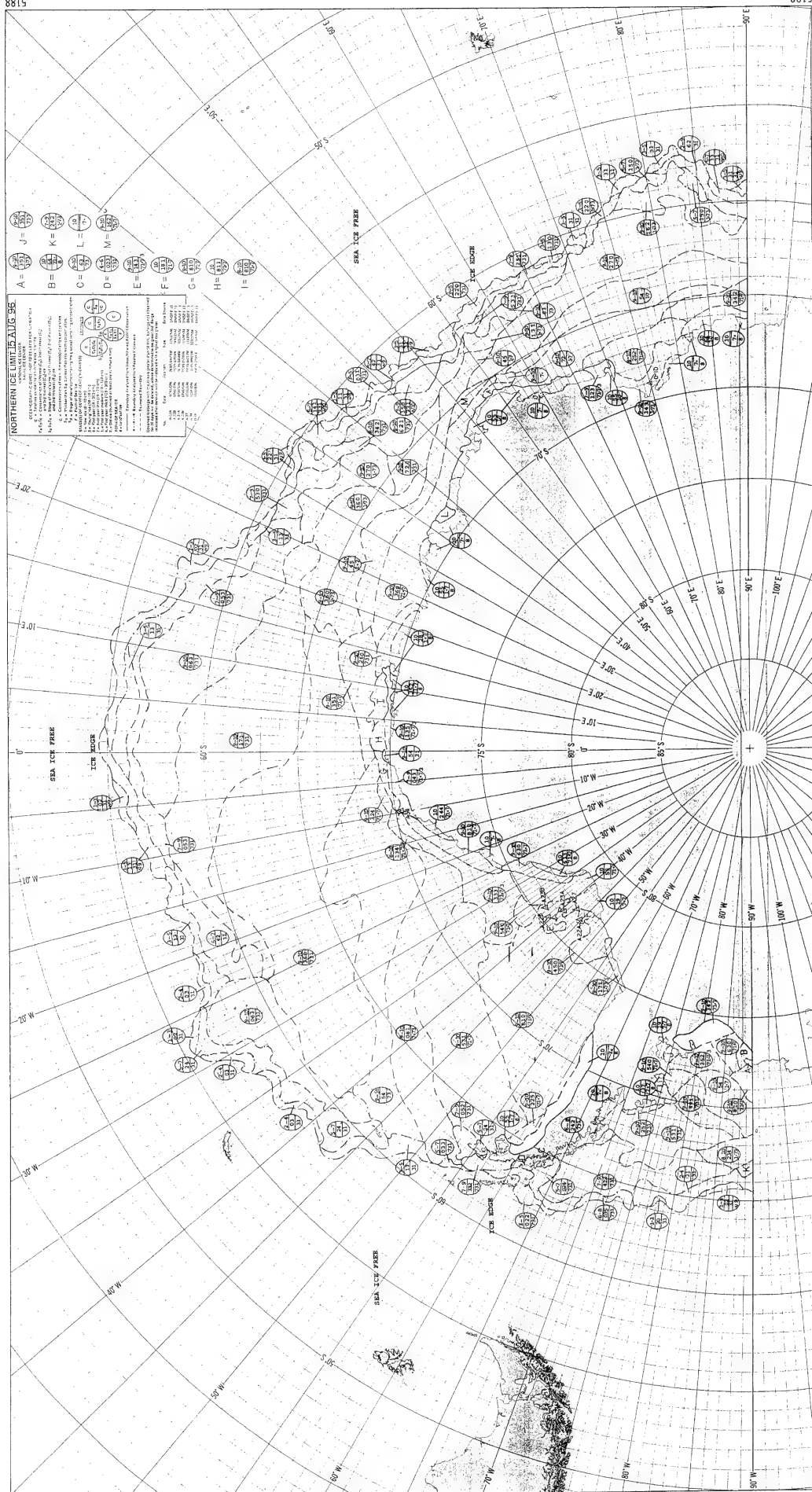




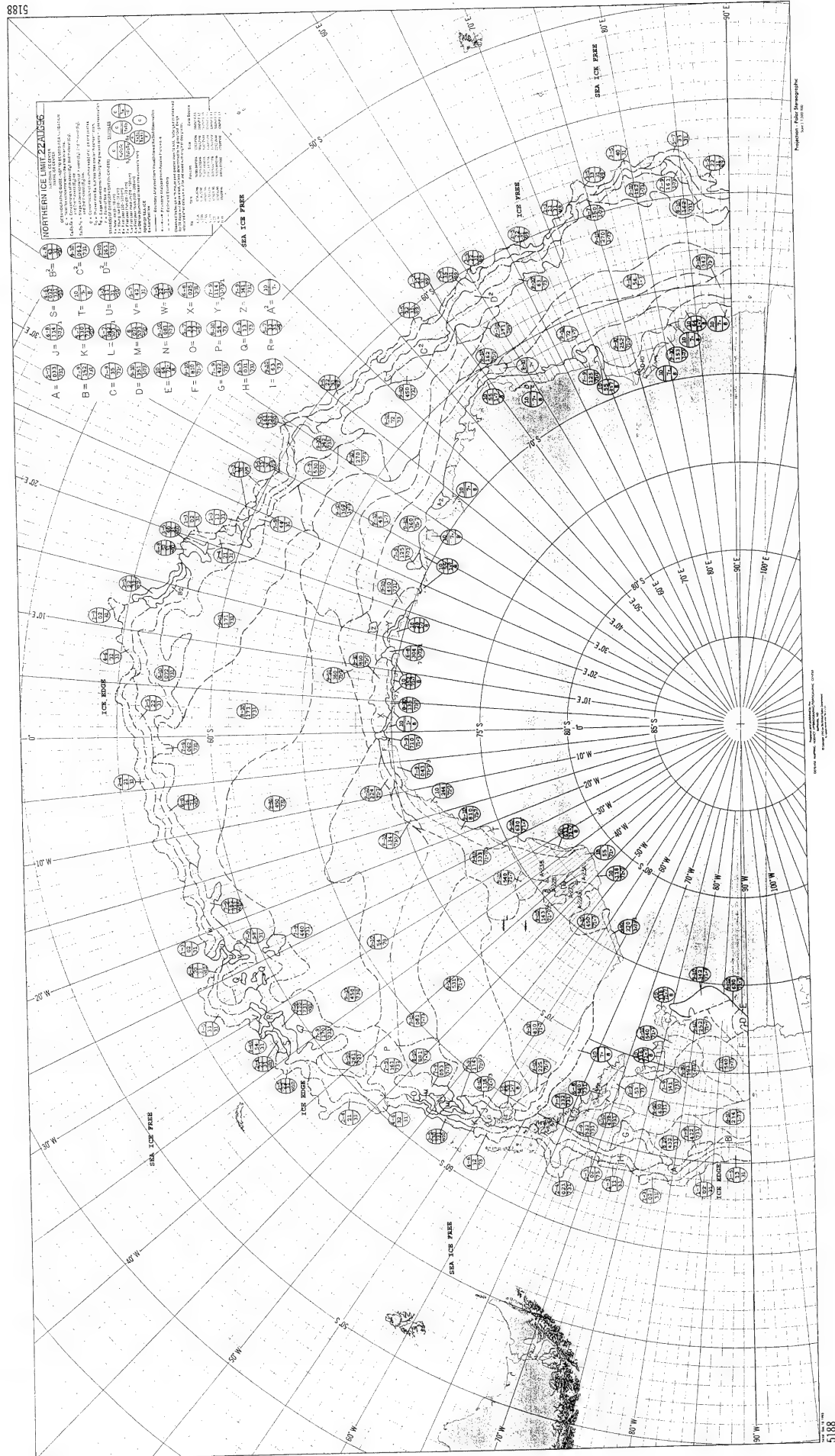


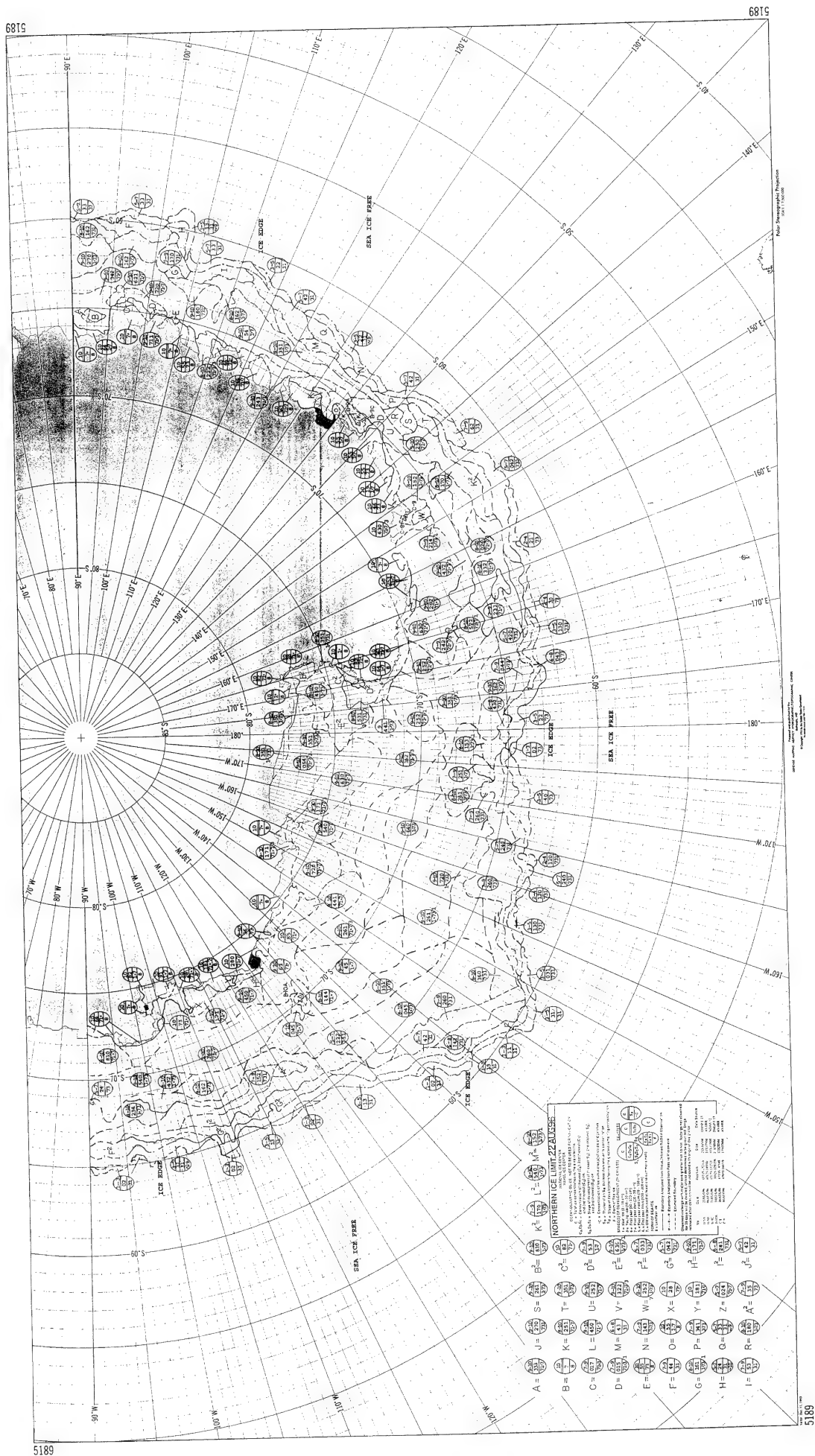


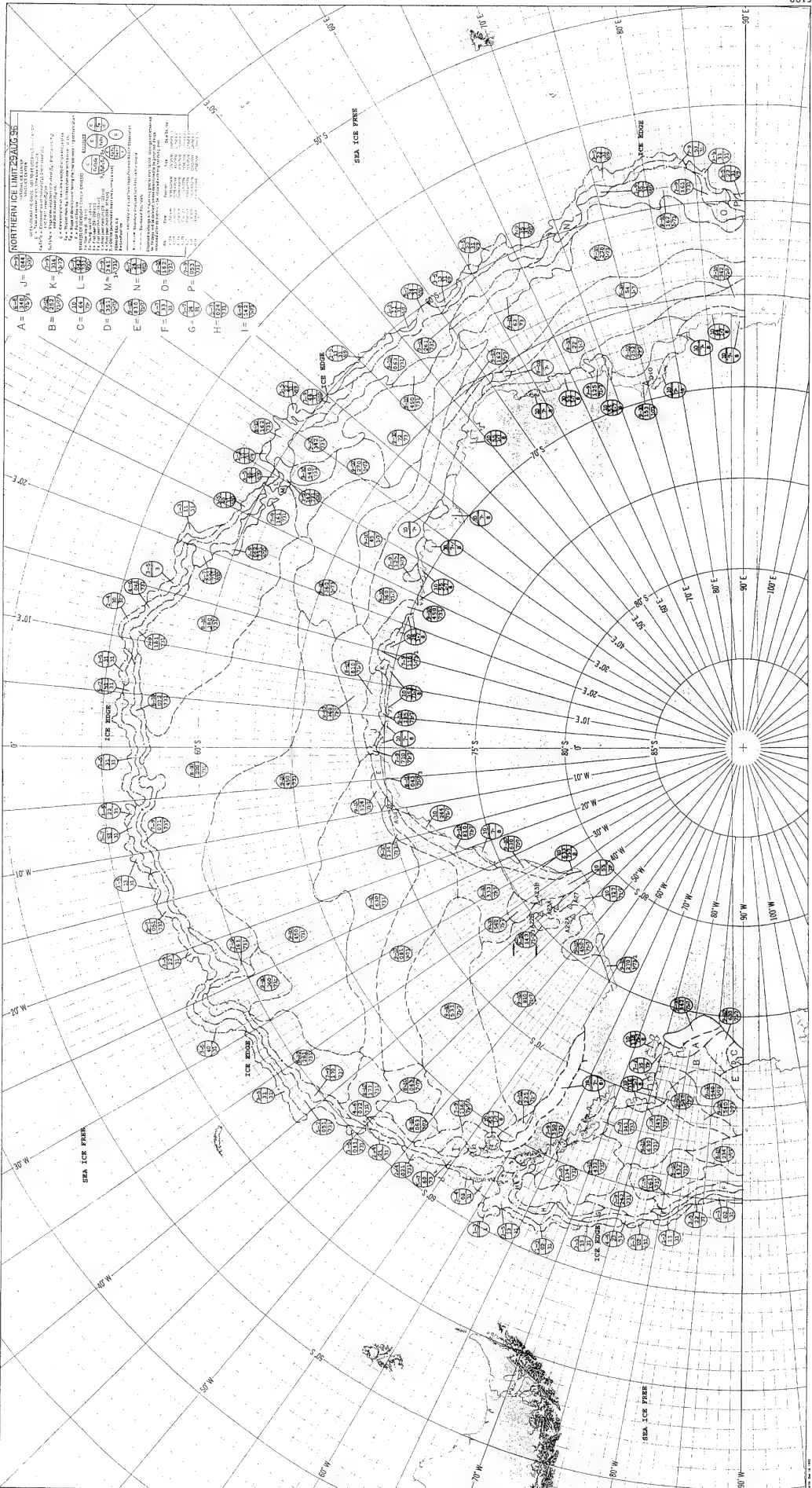


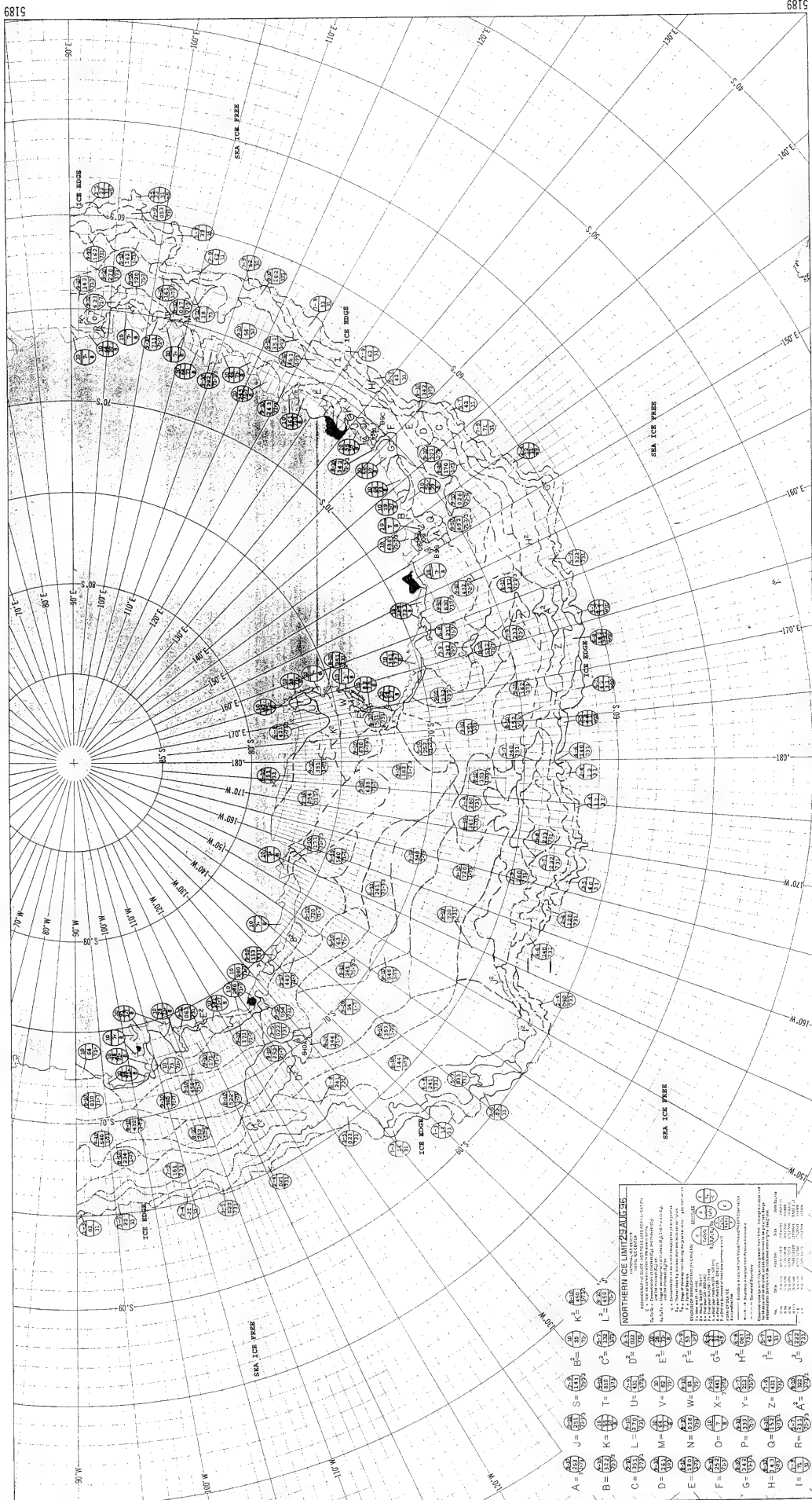








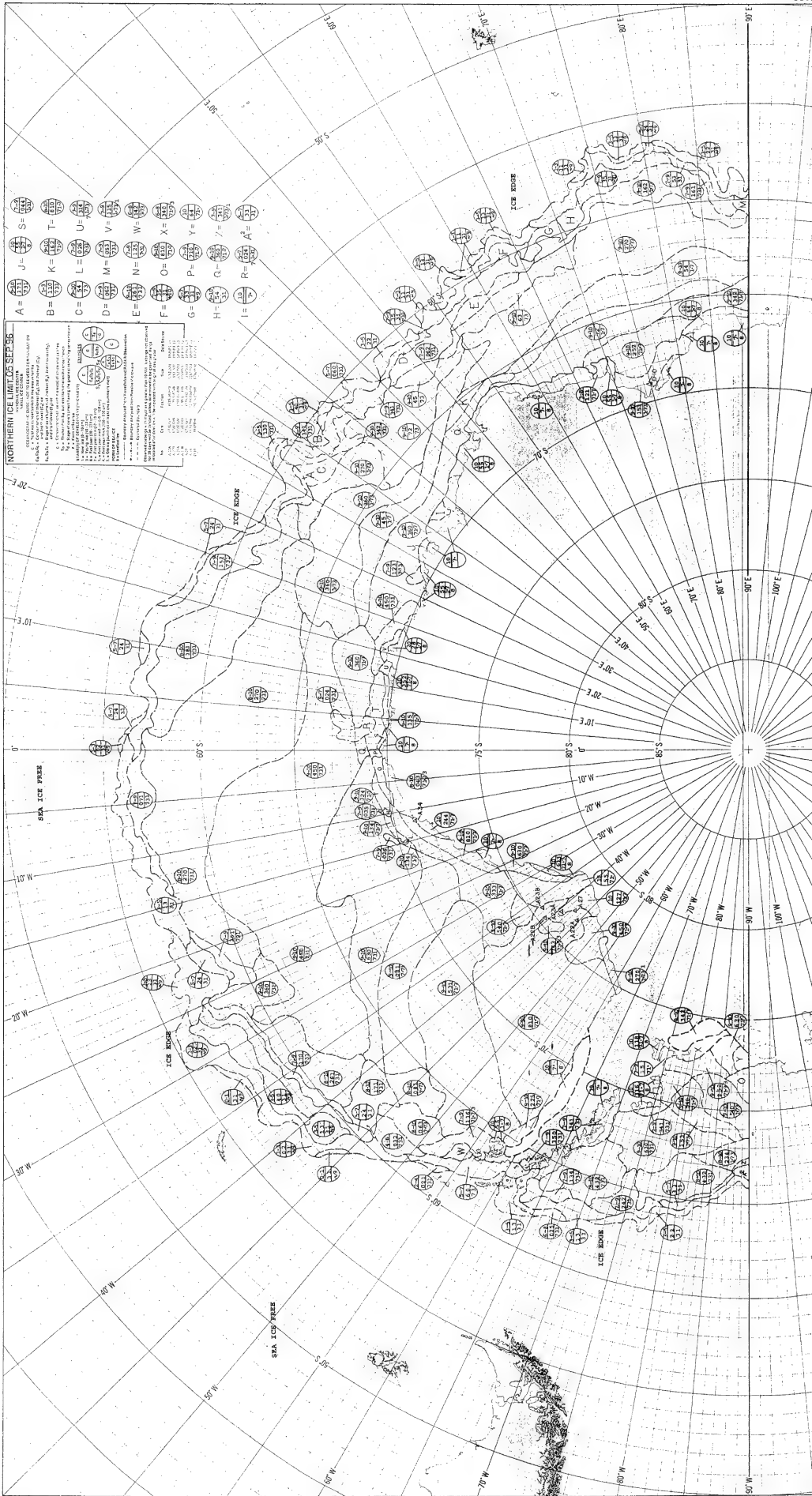




NORTHERN ICE LIMITS

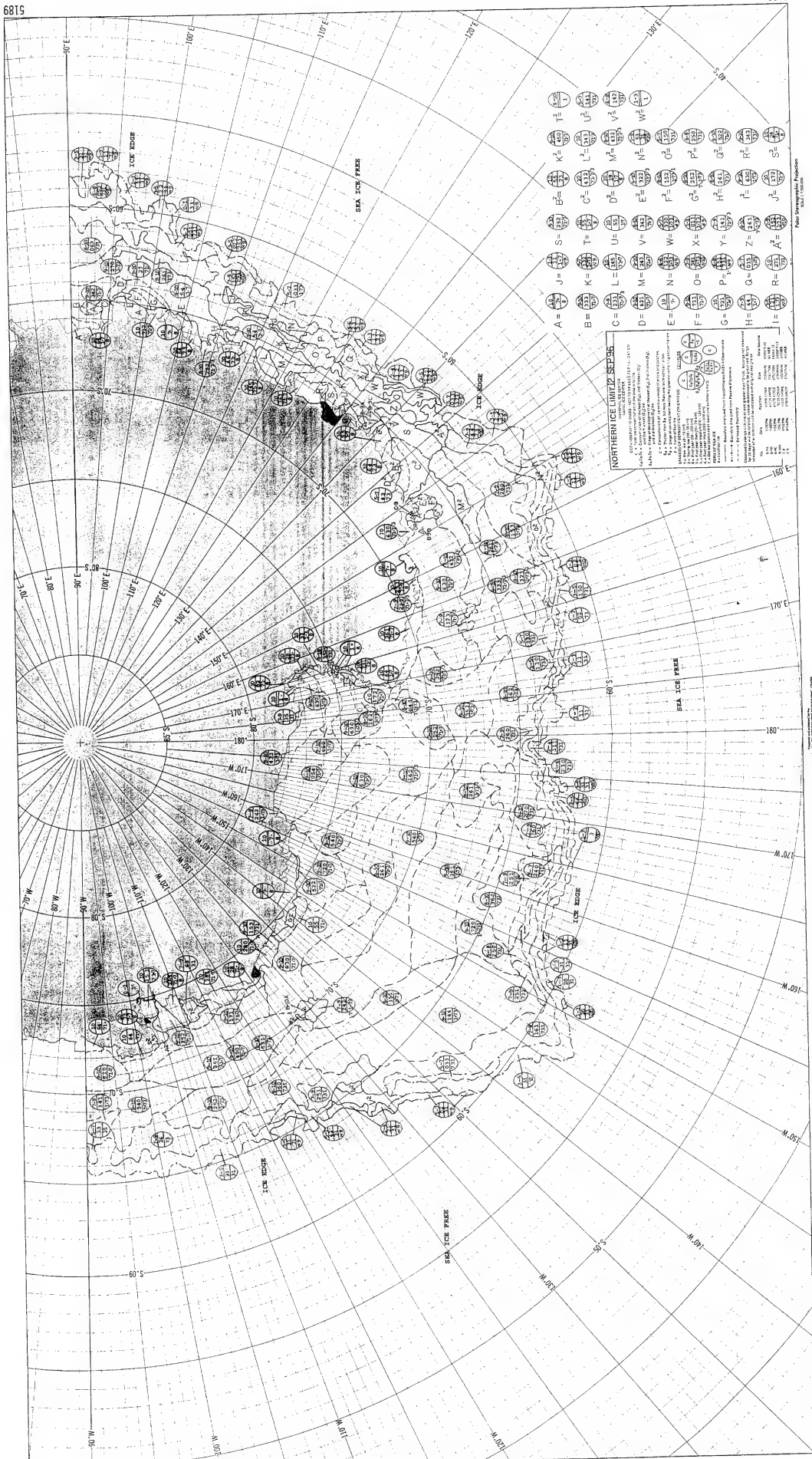
Legend symbols and their corresponding values:

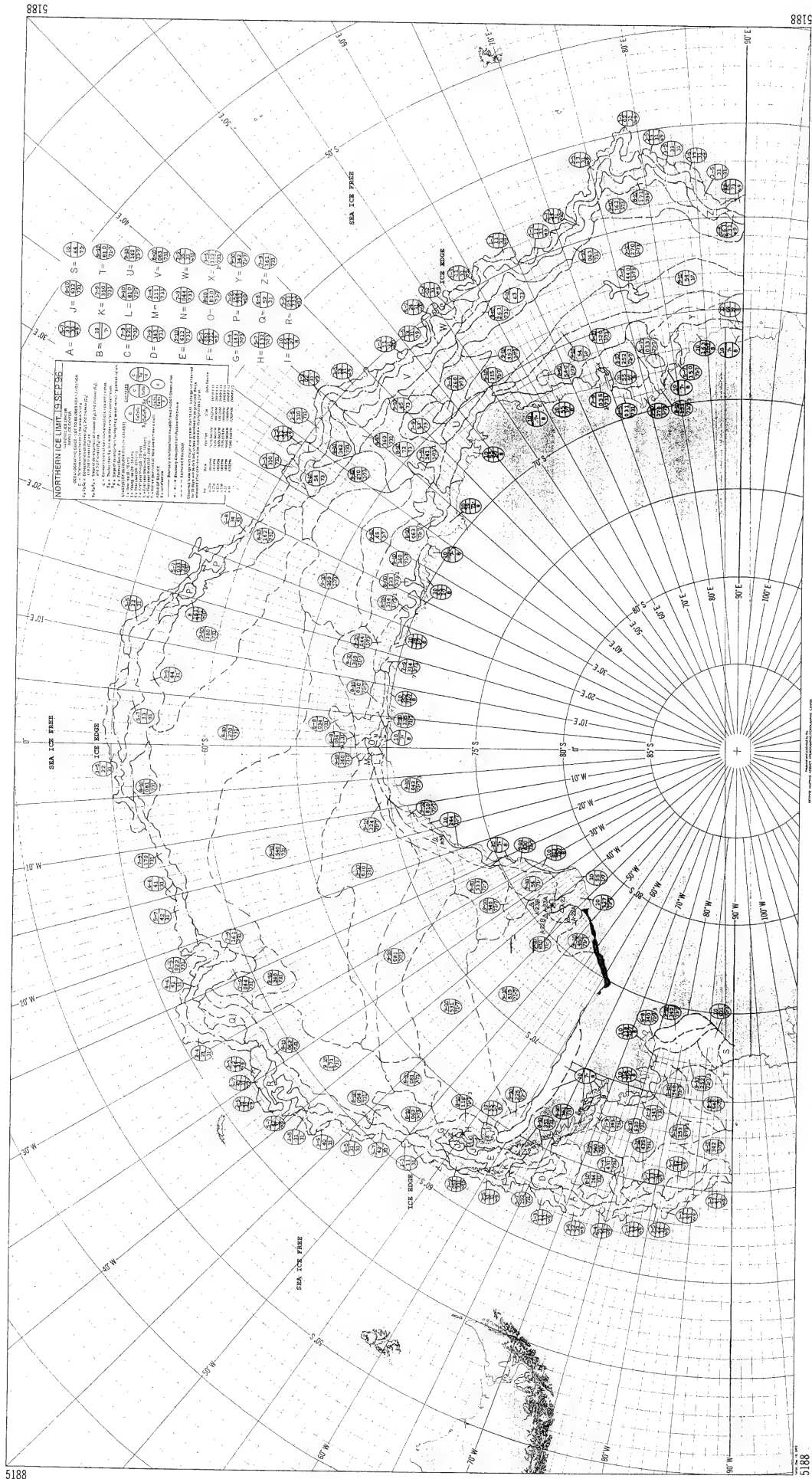
| Letter | Symbol | Value |
|--------|-------------------|-------|
| A | Circle with 1/10 | 1/10 |
| B | Circle with 2/10 | 2/10 |
| C | Circle with 3/10 | 3/10 |
| D | Circle with 4/10 | 4/10 |
| E | Circle with 5/10 | 5/10 |
| F | Circle with 6/10 | 6/10 |
| G | Circle with 7/10 | 7/10 |
| H | Circle with 8/10 | 8/10 |
| I | Circle with 9/10 | 9/10 |
| J | Circle with 10/10 | 10/10 |
| K | Circle with 11/10 | 11/10 |
| L | Circle with 12/10 | 12/10 |
| M | Circle with 13/10 | 13/10 |
| N | Circle with 14/10 | 14/10 |
| O | Circle with 15/10 | 15/10 |
| P | Circle with 16/10 | 16/10 |
| Q | Circle with 17/10 | 17/10 |
| R | Circle with 18/10 | 18/10 |
| S | Circle with 19/10 | 19/10 |
| T | Circle with 20/10 | 20/10 |
| U | Circle with 21/10 | 21/10 |
| V | Circle with 22/10 | 22/10 |
| W | Circle with 23/10 | 23/10 |
| X | Circle with 24/10 | 24/10 |
| Y | Circle with 25/10 | 25/10 |
| Z | Circle with 26/10 | 26/10 |
| A | Circle with 27/10 | 27/10 |





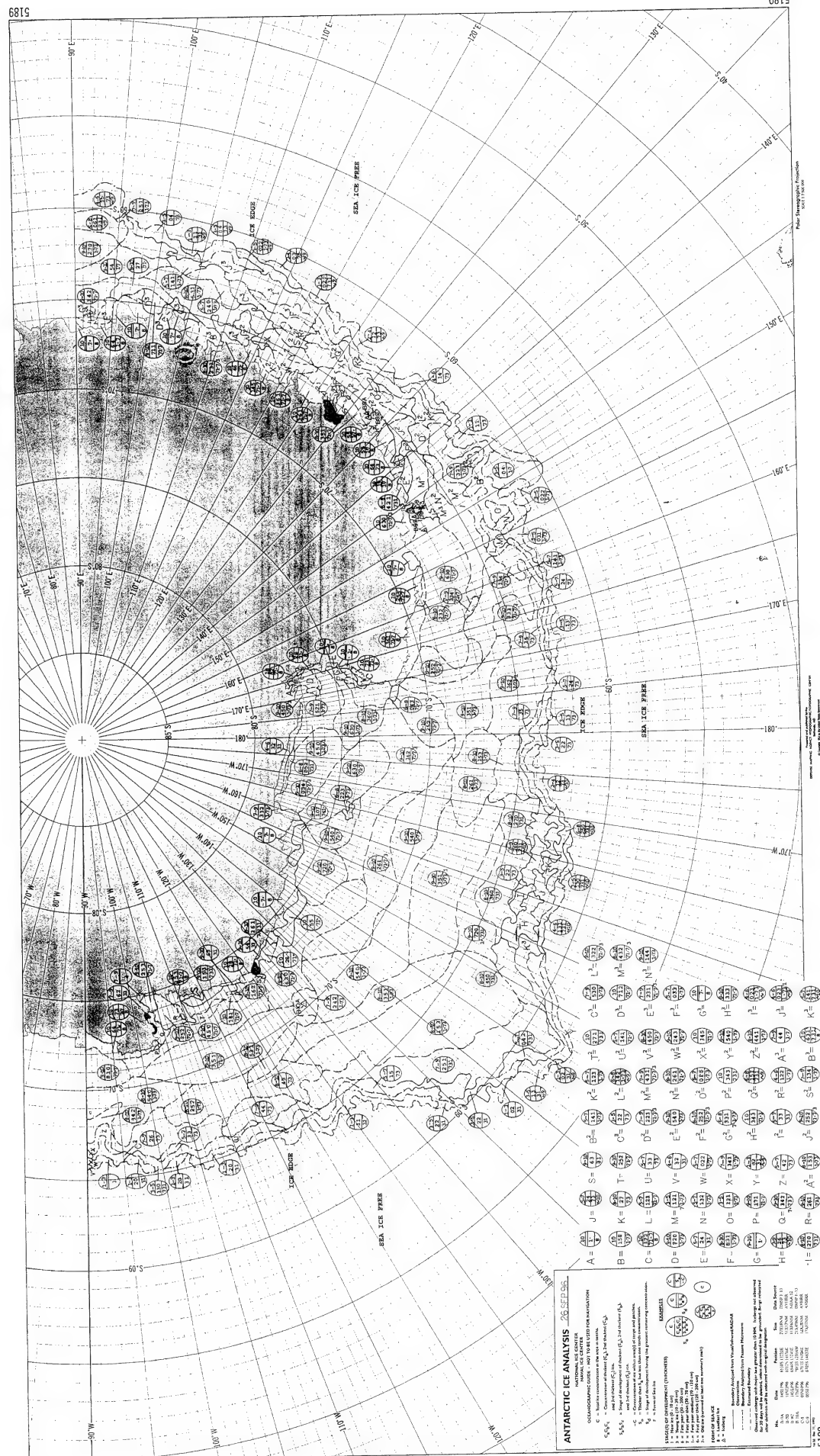


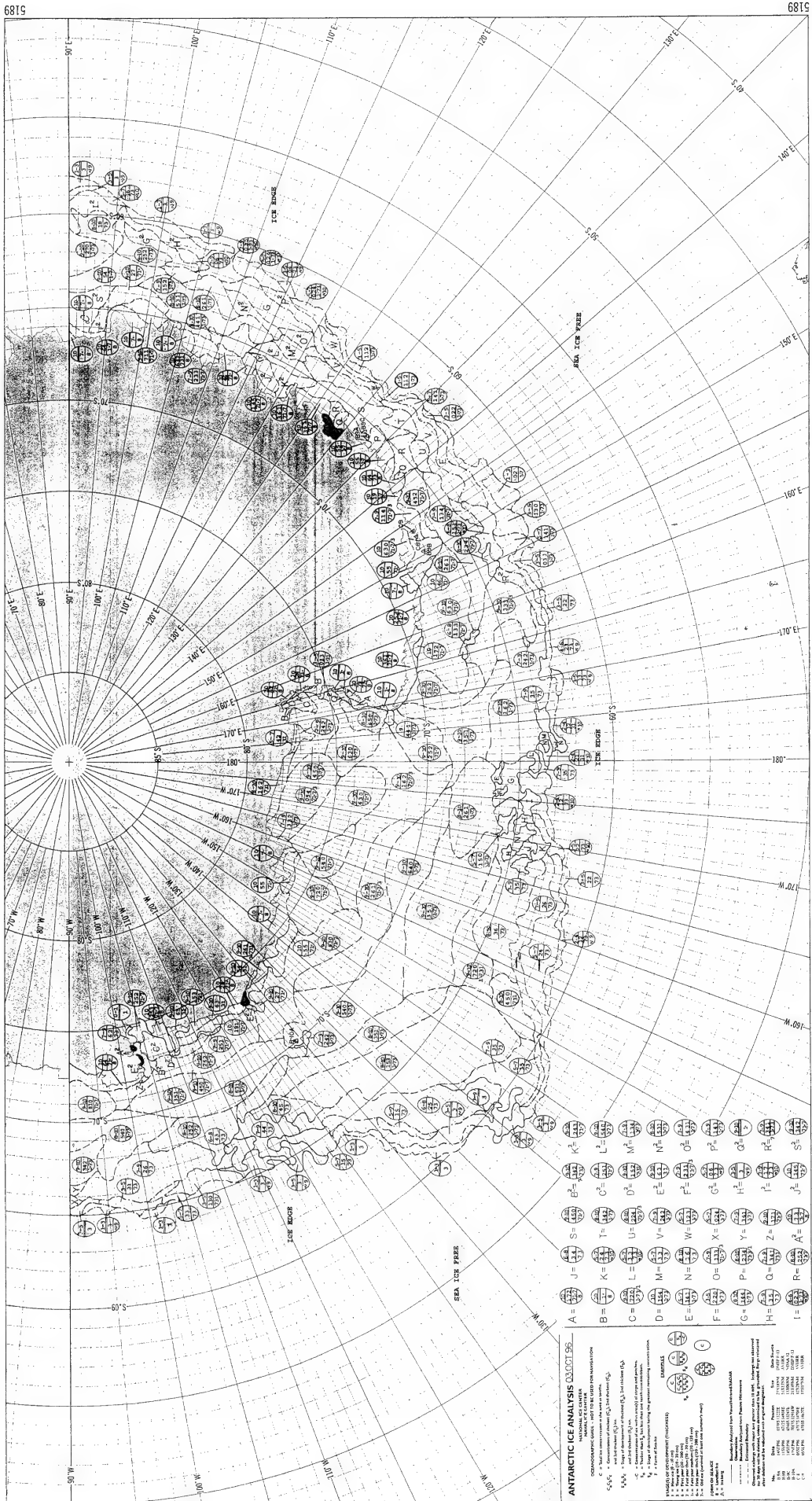








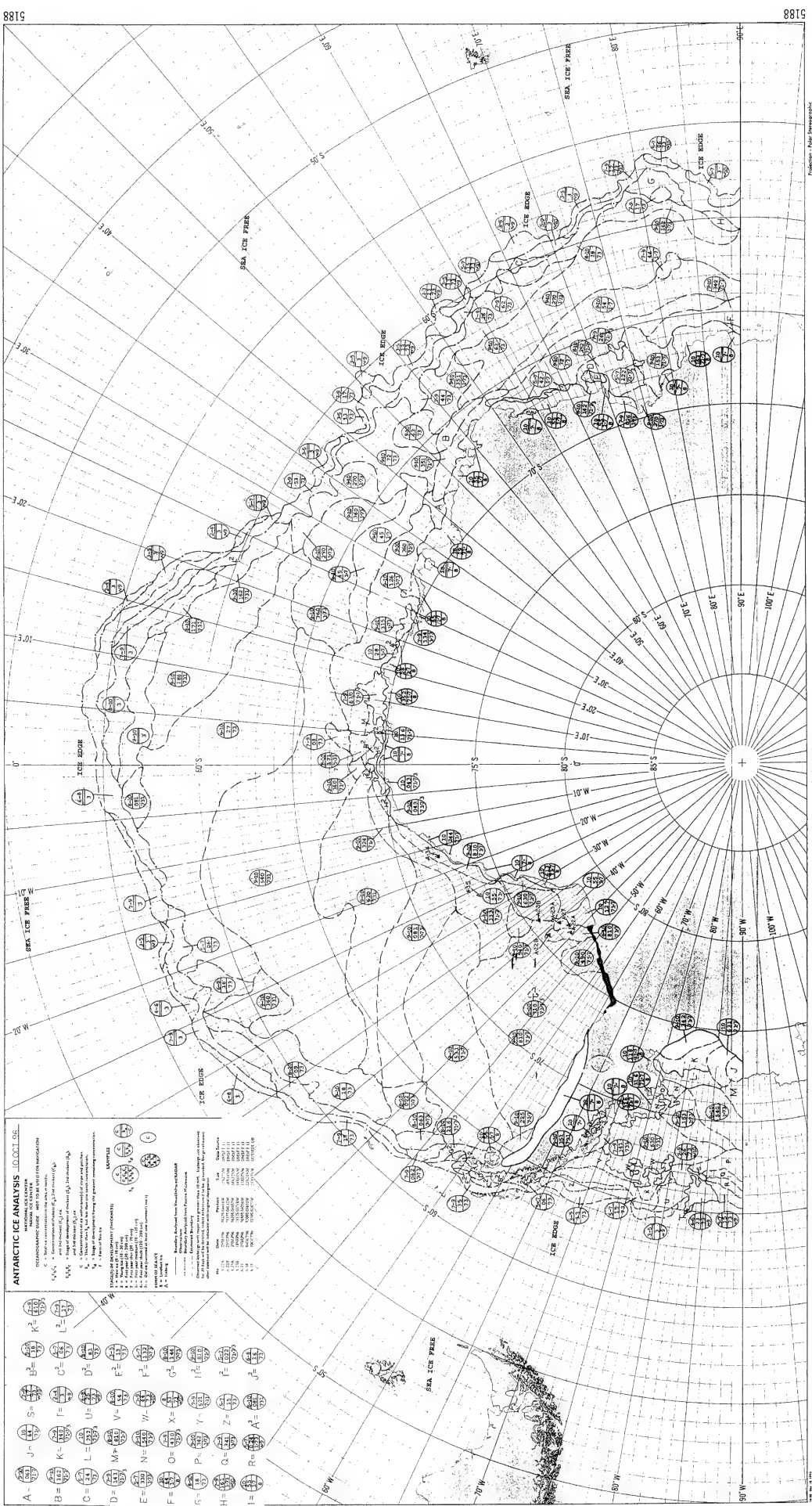


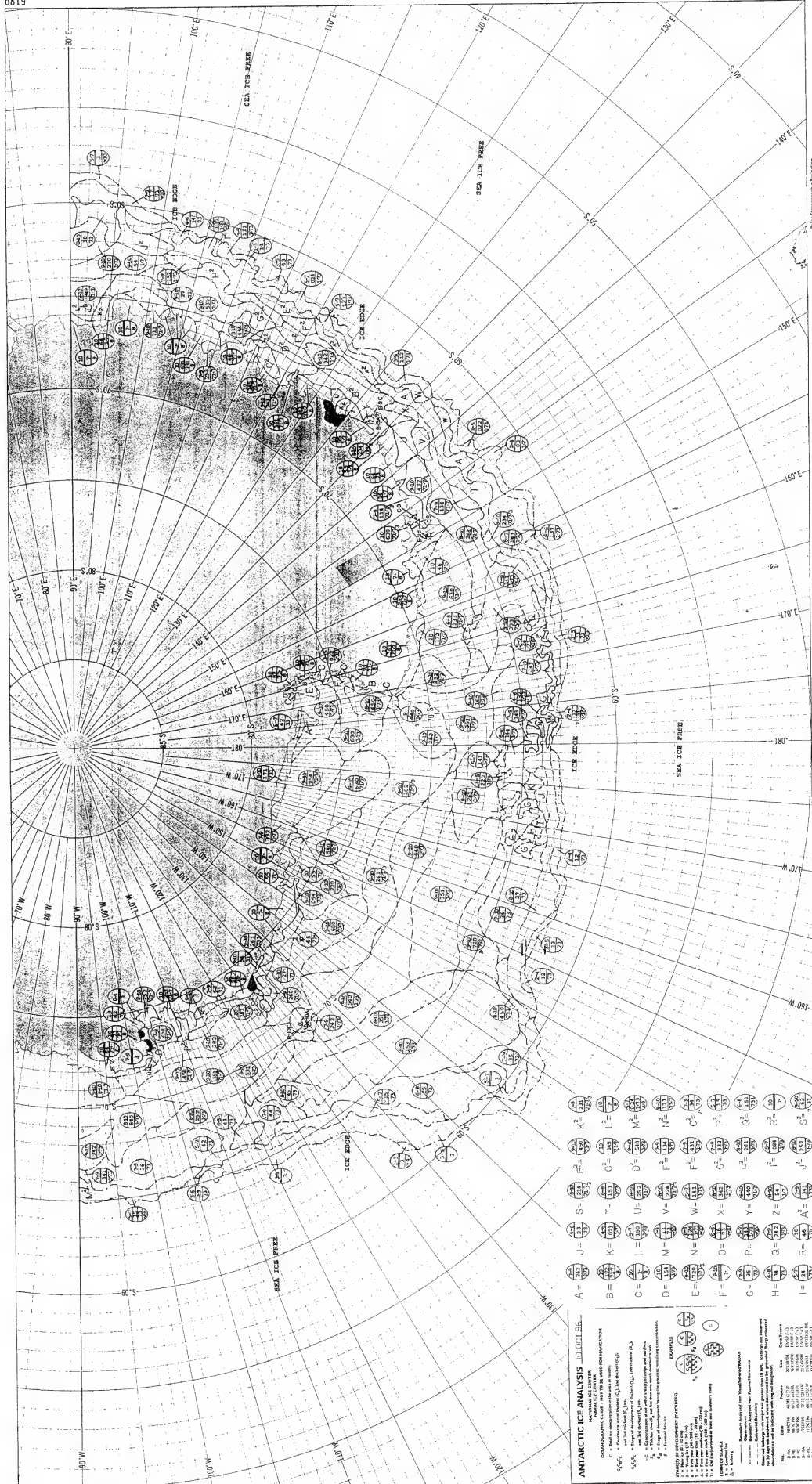


ANTARCTIC ICE ANALYSIS SYMBOLS

Instructions for use of this chart are given in the accompanying booklet. The symbols are used to indicate the presence of ice in the area. The letters A through Z are used to indicate the type of ice. The numbers 1 through 9 are used to indicate the thickness of the ice. The symbols are used to indicate the presence of ice in the area. The letters A through Z are used to indicate the type of ice. The numbers 1 through 9 are used to indicate the thickness of the ice.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----------------|-----|----------------|-----|----------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|
| A = | 1/4" (6.35 mm) | B = | 1/2" (12.7 mm) | C = | 3/4" (19.0 mm) | D = | 1" (25.4 mm) | E = | 1 1/4" (31.8 mm) | F = | 1 1/2" (38.1 mm) | G = | 1 3/4" (44.5 mm) | H = | 2" (50.8 mm) | I = | 2 1/4" (63.5 mm) | J = | 2 1/2" (63.5 mm) | K = | 2 3/4" (68.8 mm) | L = | 3" (76.2 mm) | M = | 3 1/4" (86.1 mm) | N = | 3 1/2" (88.9 mm) | O = | 3 3/4" (91.4 mm) | P = | 4" (101.6 mm) | Q = | 4 1/4" (111.8 mm) | R = | 4 1/2" (114.3 mm) | S = | 4 3/4" (119.4 mm) | T = | 5" (127.0 mm) | U = | 5 1/4" (137.2 mm) | V = | 5 1/2" (139.7 mm) | W = | 5 3/4" (146.1 mm) | X = | 6" (152.4 mm) | Y = | 6 1/4" (162.6 mm) | Z = | 6 1/2" (165.1 mm) | A = | 6 3/4" (170.2 mm) |
|-----|----------------|-----|----------------|-----|----------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|--------------|-----|------------------|-----|------------------|-----|------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|---------------|-----|-------------------|-----|-------------------|-----|-------------------|

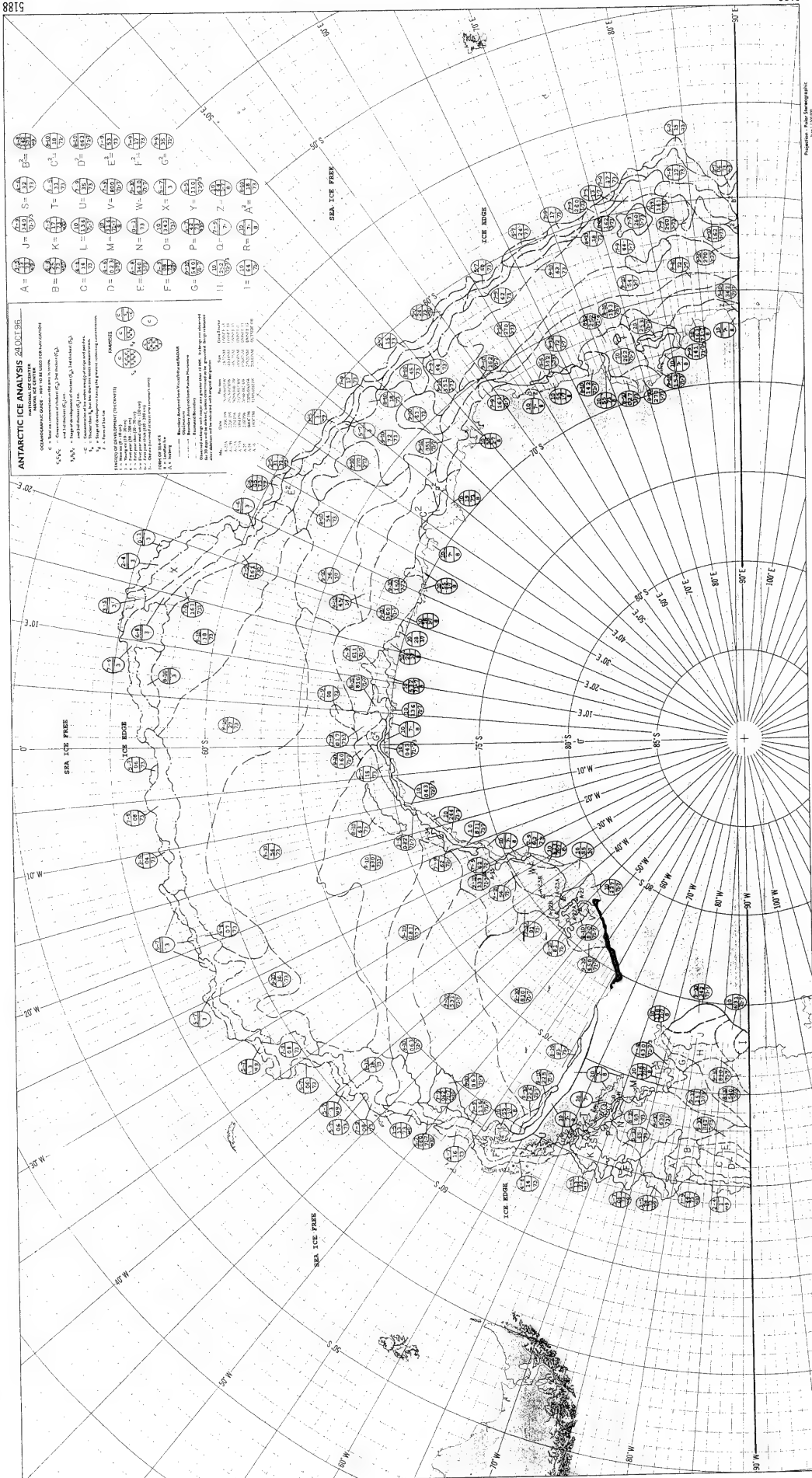




ANTARCTIC ICE ANALYSIS - DONT 5189

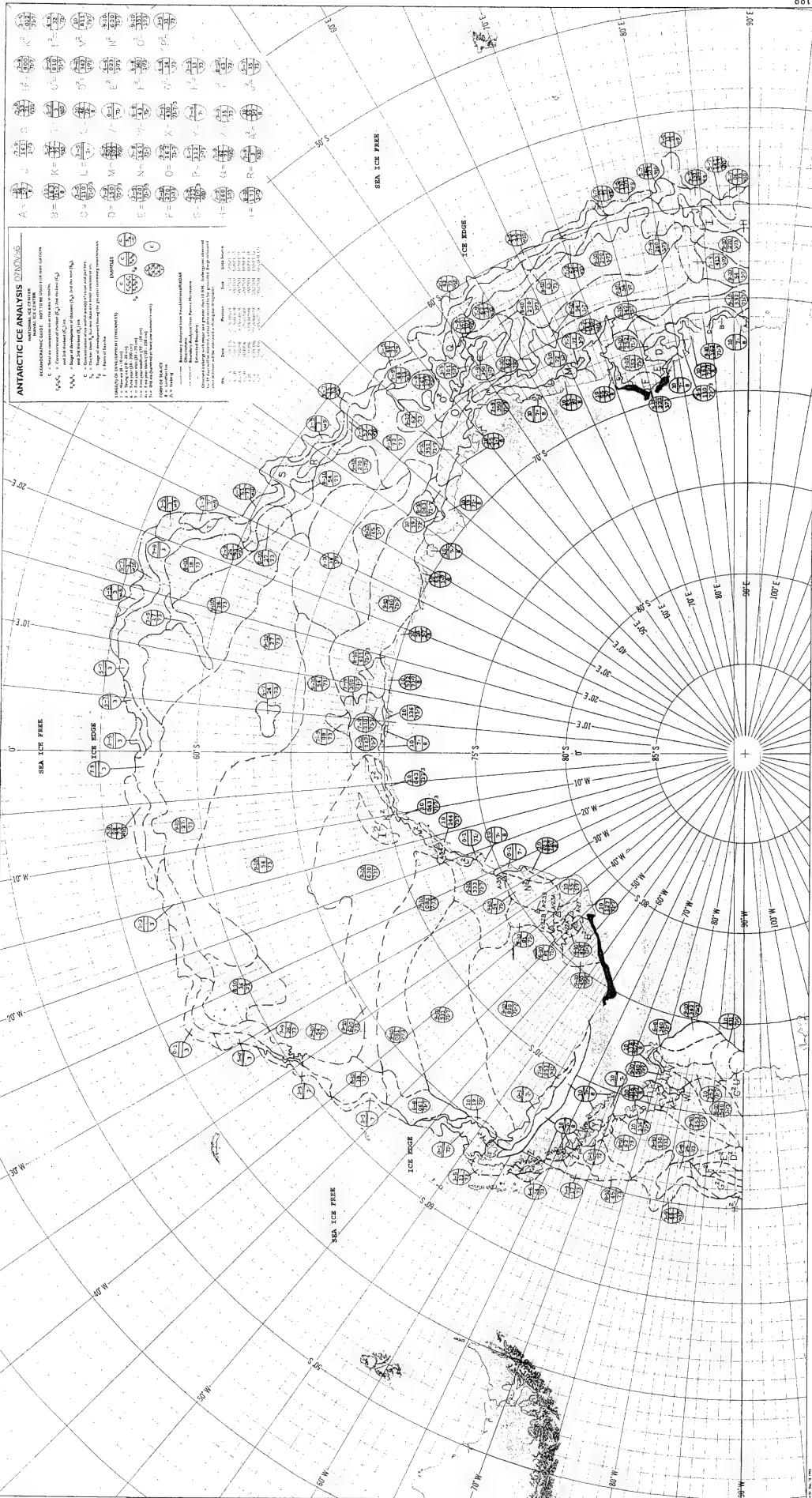
Map showing ice extent, ice edge, and sea ice freeze lines. The chart includes a grid of latitude and longitude, with various symbols and codes indicating ice conditions. The map shows the continent of Antarctica and surrounding waters, with labels for 'SEA ICE FREE', 'ICE EDGE', and 'ICE BOUNDARY'.

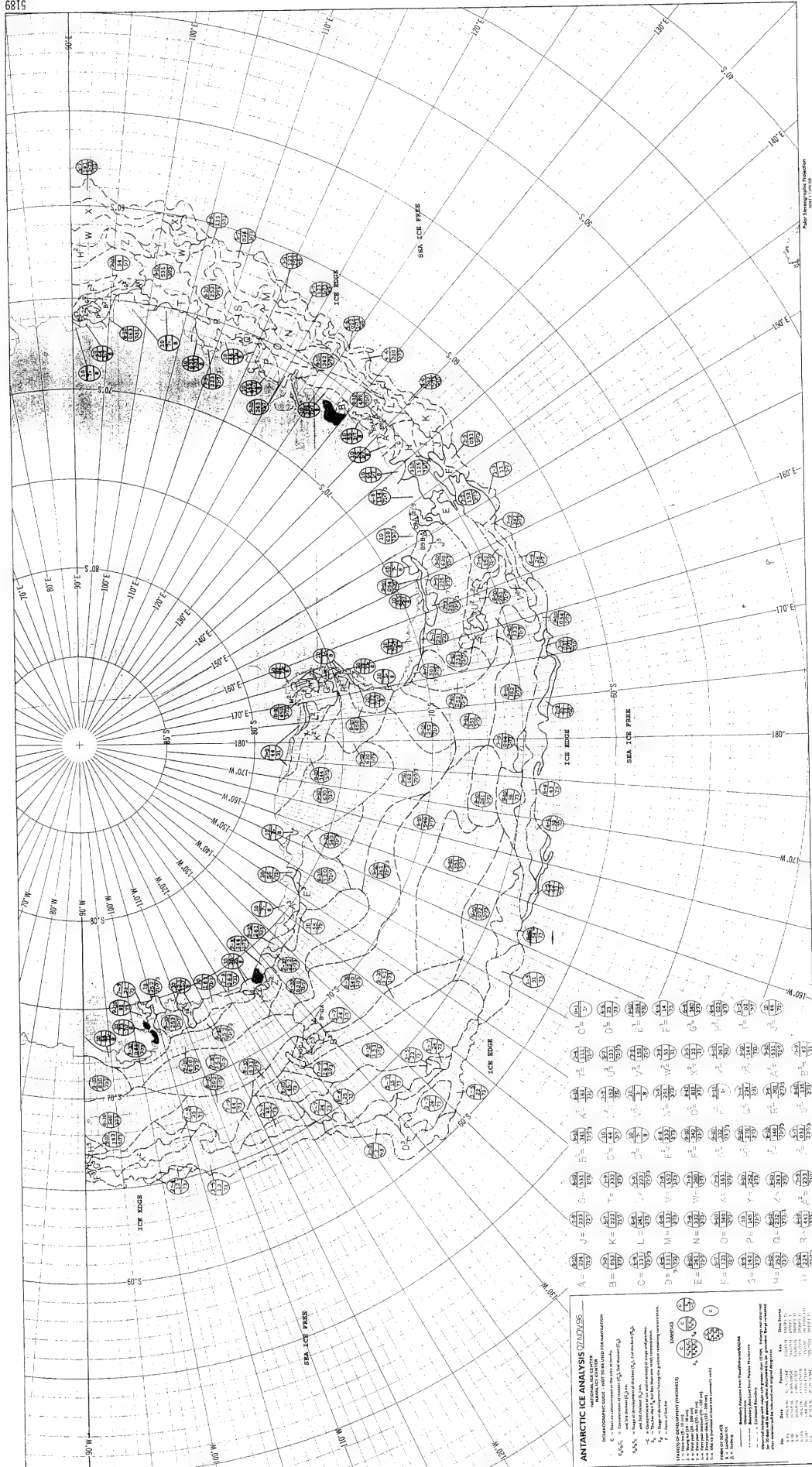




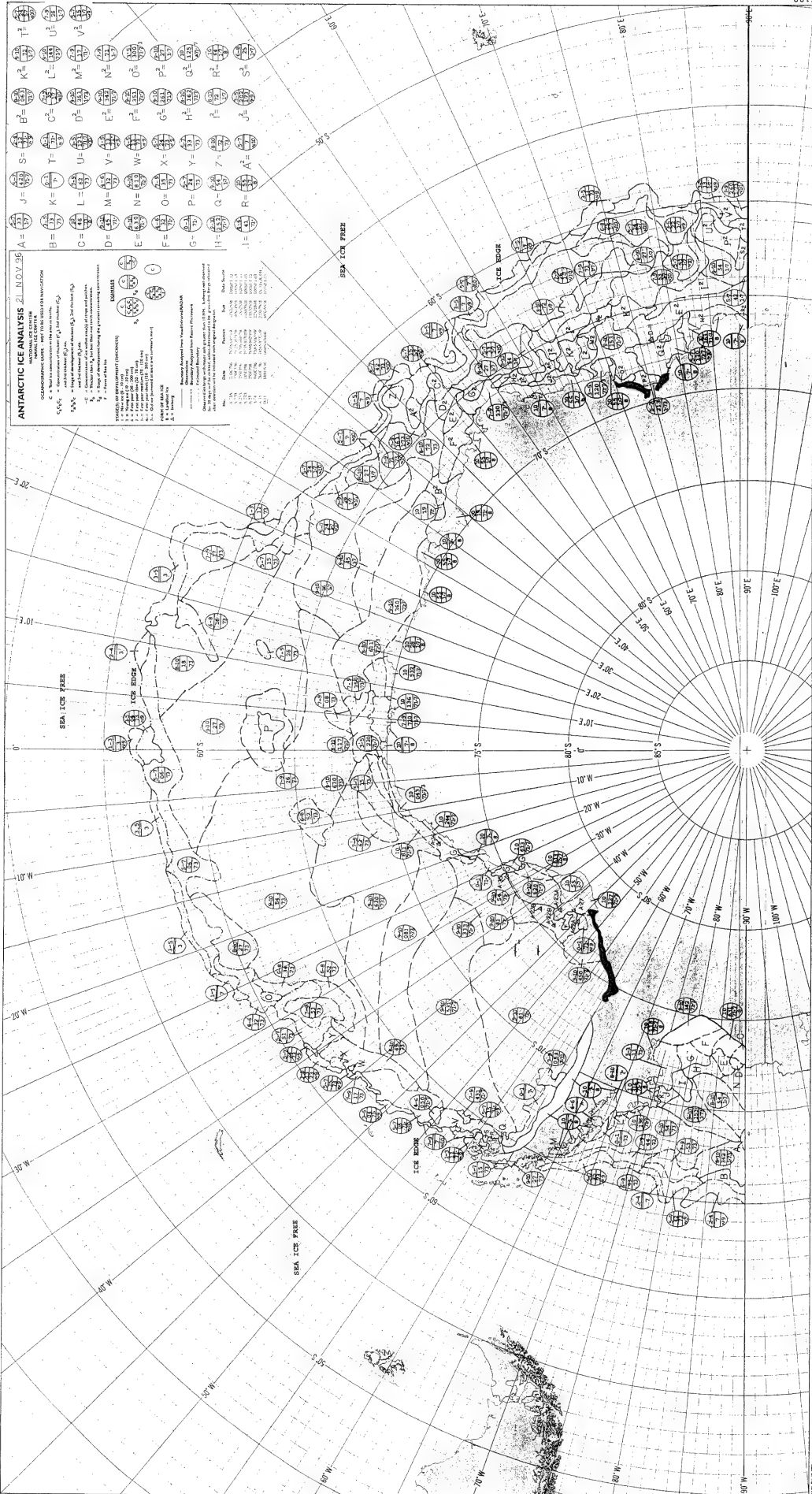




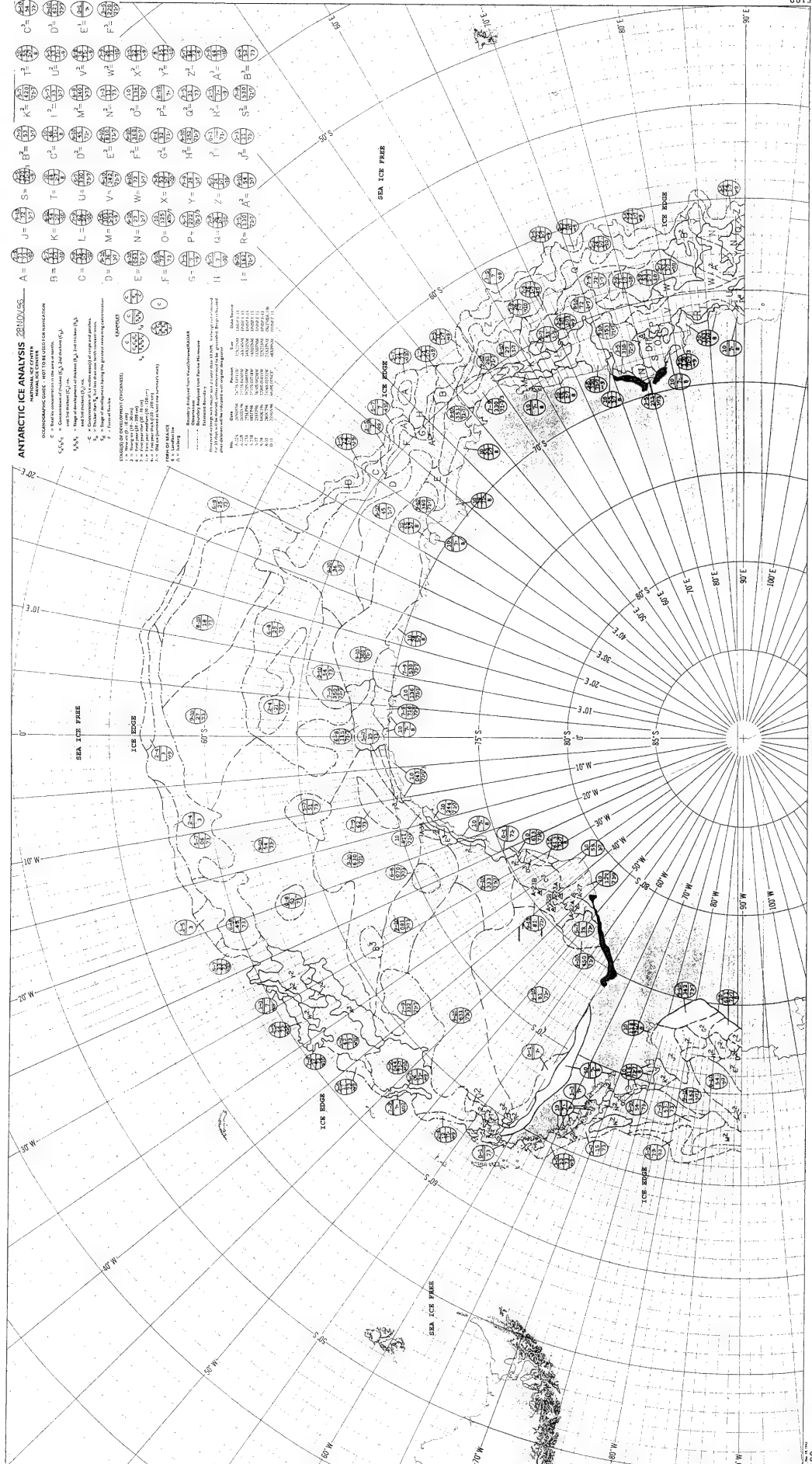


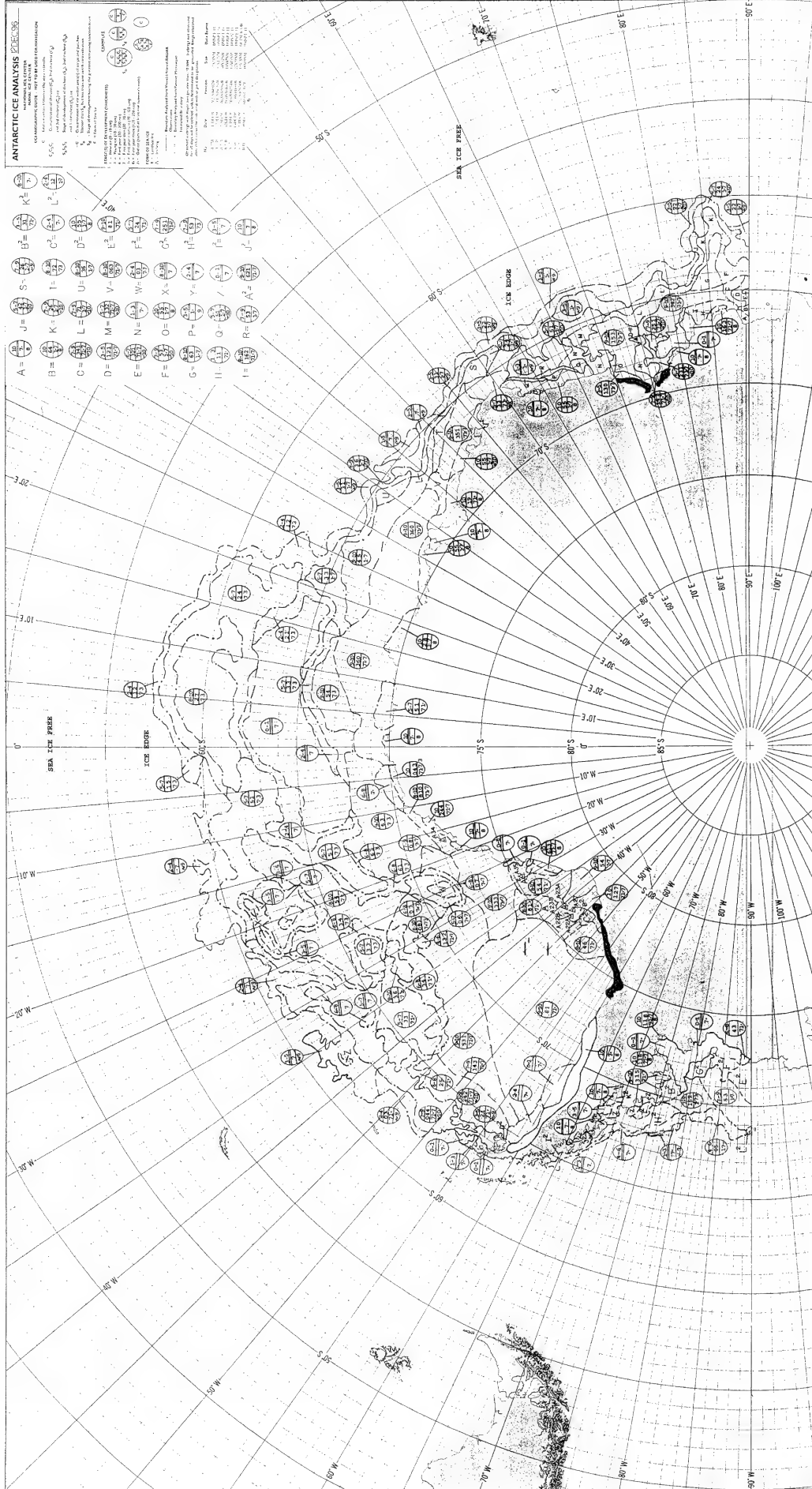


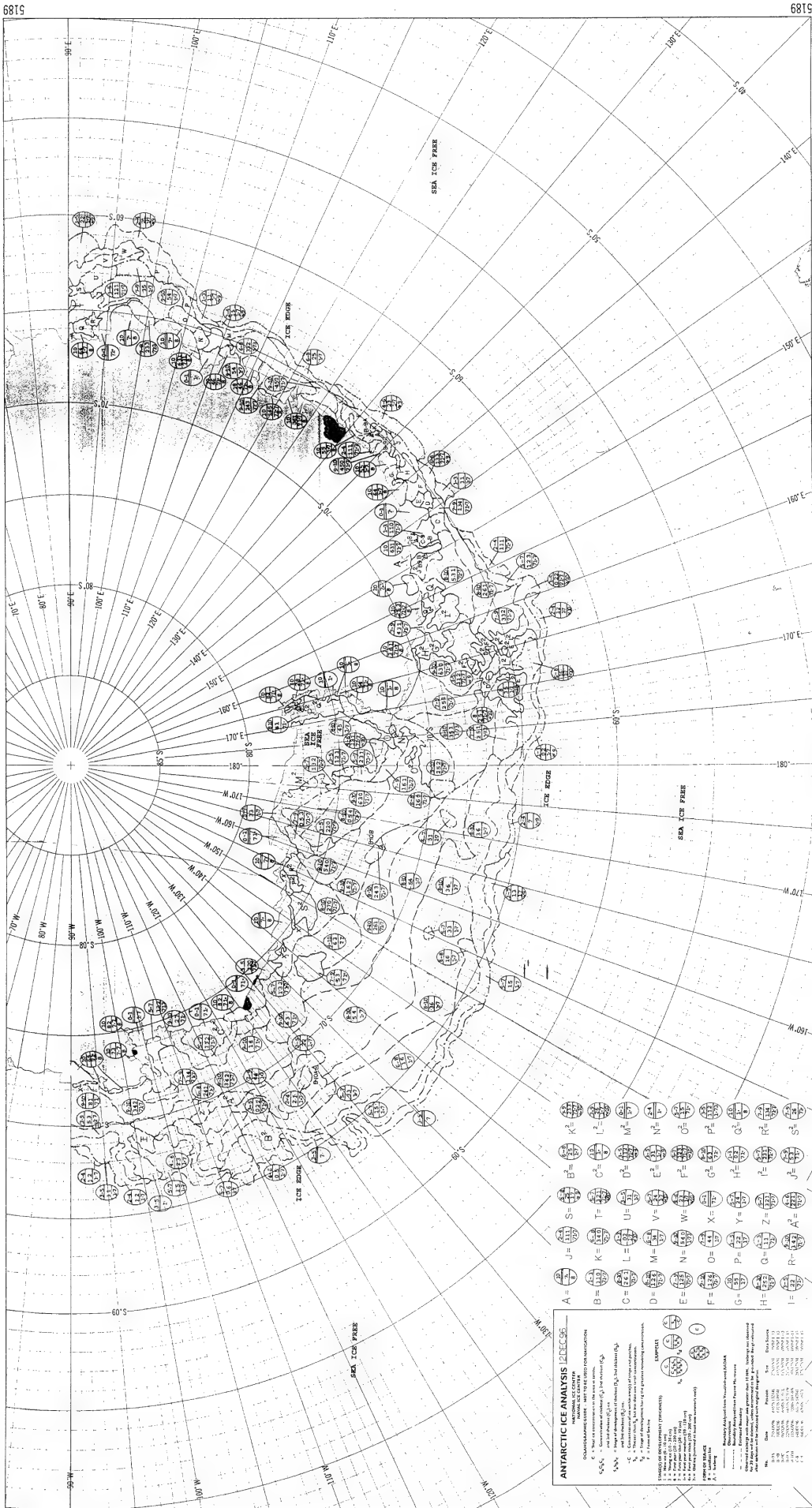












ANTARCTIC ICE ANALYSIS

SYMBOLS FOR DATA

SYMBOLS FOR ANALYSIS

SYMBOLS FOR RESULTS

SYMBOLS FOR COMMENTS

SYMBOLS FOR NOTES

SYMBOLS FOR REFERENCES

SYMBOLS FOR SOURCES

SYMBOLS FOR DATES

SYMBOLS FOR TIMES

SYMBOLS FOR PLACES

SYMBOLS FOR OBJECTS

SYMBOLS FOR ACTIONS

SYMBOLS FOR RELATIONS

SYMBOLS FOR QUANTITIES

SYMBOLS FOR QUALITIES

SYMBOLS FOR STATES

SYMBOLS FOR TRENDS

SYMBOLS FOR PATTERNS

SYMBOLS FOR BEHAVIORS

SYMBOLS FOR PROPERTIES

SYMBOLS FOR FUNCTIONS

SYMBOLS FOR OPERATIONS

SYMBOLS FOR LOGIC

SYMBOLS FOR SETS

SYMBOLS FOR NUMBERS

SYMBOLS FOR ALGEBRA

SYMBOLS FOR CALCULUS

SYMBOLS FOR PHYSICS

SYMBOLS FOR CHEMISTRY

SYMBOLS FOR BIOLOGY

SYMBOLS FOR MEDICINE

SYMBOLS FOR ASTRONOMY

SYMBOLS FOR GEOGRAPHY

SYMBOLS FOR HISTORY

SYMBOLS FOR LITERATURE

SYMBOLS FOR ARTS

SYMBOLS FOR SPORTS

SYMBOLS FOR RECREATION

SYMBOLS FOR EDUCATION

SYMBOLS FOR SCIENCE

SYMBOLS FOR TECHNOLOGY

SYMBOLS FOR INDUSTRY

SYMBOLS FOR BUSINESS

SYMBOLS FOR FINANCE

SYMBOLS FOR LAW

SYMBOLS FOR POLITICS

SYMBOLS FOR SOCIETY

SYMBOLS FOR CULTURE

SYMBOLS FOR RELIGION

SYMBOLS FOR PHILOSOPHY

SYMBOLS FOR ETHICS

SYMBOLS FOR PSYCHOLOGY

SYMBOLS FOR SOCIOLOGY

SYMBOLS FOR ANTHROPOLOGY

SYMBOLS FOR LINGUISTICS

SYMBOLS FOR LITERATURE

SYMBOLS FOR ARTS

SYMBOLS FOR SPORTS

SYMBOLS FOR RECREATION

SYMBOLS FOR EDUCATION

SYMBOLS FOR SCIENCE

SYMBOLS FOR TECHNOLOGY

SYMBOLS FOR INDUSTRY

SYMBOLS FOR BUSINESS

SYMBOLS FOR FINANCE

SYMBOLS FOR LAW

SYMBOLS FOR POLITICS

SYMBOLS FOR SOCIETY

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SYMBOLS FOR SOCIOLOGY

SYMBOLS FOR ANTHROPOLOGY

SYMBOLS FOR LINGUISTICS



